DOCUMENT RESUME

ED 143 522 SE 023 000

TITLE	ELMA Technical Reports, No. 4. Grade 3 Test Batteries, Description and Statistical Properties of Scales.
INSTITUTION	Stanford Univ., Calif. School Mathematics Study Group.
SPONS AGENCY	National Science Foundation, Washington, D.C.
PUB DATE	71
NOTE	186p.; For related documents, see SE 022 997-999; Contains occasional light type
EDRS PRICE	MF-$0.83 HC-$10.03 Plus Postage.
DESCRIPTORS	*Achievement; Arithmetic; Elementary Education; *Elementary School Mathematics; Evaluation; *Grade 3; Mathematics Education; *Number Concepts; Test Results; *Tests
IDENTIFIERS	*Elementary Mathematics Project; *School Mathematics Study Group

ABSTRACT

In the fall of 1966, the School Mathematics Study Group embarked upon a four-year longitudinal study of mathematical learning in the primary grades, the Elementary Mathematics Project (ELMA). The primary purpose of the study was to assess children's progress in learning particular mathematical ideas during the beginning school years. This volume contains information related to the grade 3 tests. The first part of the volume contains procedures for giving the tests and the test batteries. The second part of the volume contains the description and statistical properties of the grade 3 scales derived from these test batteries. (RH)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED143522

SCHOOL MATHEMATICS STUDY GROUP

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

SMSG

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) AND THE ERIC SYSTEM CONTRACTORS."

ELMA TECHNICAL REPORTS

No. 4

Grade 3 Test Batteries, Description and Statistical Properties of Scales

SE 023 000

Financial support for the School Mathematics Study Group has been provided by the National Science Foundation.

Permission to make verbatim use of material in this book must be secured from the Director of SMSG. Such permission will be granted except in unusual circumstances. Publications incorporating SMSG materials must include both an acknowledgment of the SMSG copyright (Yale University or Stanford University, as the case may be) and a disclaimer of SMSG endorsement. Exclusive license will not be granted save in exceptional circumstances, and then only by specific action of the Advisory Board of SMSG.

© 1971 by The Board of Trustees of the Leland Stanford Junior University
All rights reserved
Printed in the United States of America

FOREWORD

In the fall of 1966, the School Mathematics Study Group embarked upon a four-year longitudinal study of mathematical learning in the primary grades, The Elementary Mathematics Project (ELMA). The primary purpose of this study is to assess children's progress in learning particular mathematical ideas during the beginning school years. With these findings, the possibility exists of developing, in the future, more effective materials and procedures for teaching children coming to school with differential pre-school experiences as well as better understanding young children's learning of mathematics.

The pilot phase of this longitudinal study was undertaken from 1964 to 1966 in the Special Curriculum Project* during which time the tests for kindergarten and Grade 1 were developed, pre-tested, and modified.

The study population included approximately 2,000 children entering kindergarten in September, 1966, in selected schools in two large cities. The schools selected met two criteria: they drew on residential areas which were predominantly either lower or middle income groups, and each particular group of elementary schools fed into a common junior high school. Within one city, four cells were formed, two each from lower income areas and two from middle to higher income areas. One lower and one middle income cell were using the School Mathematics Study Group curriculum, and the other comparable cells were using the Science Research Associates program which is the state adopted mathematics textbook series in California for the primary grades. In the second city, three cells were formed, the omitted cell being the middle income SMSG curriculum group. The data in this volume are reported for City 1.

The children were tested twice a year, one battery in the fall and another in the spring, starting in kindergarten and extending through Grade 3. The

---

*The two SMSG puplications which report on the Special Curriculum Study are: Leiderman, Gloria F., Chinn, W. G., and Dunkley, M. E., SMSG Reports No. 2, The Special Curriculum Project: Pilot Program on Mathematics Learning of Culturally Disadvantaged Primary School Children. Stanford University, 1966; and Chinn, W. G. and Summerfield, Jeanette O., SMSG Reports No. 4, The Special Curriculum Project: 1965-1966. Stanford University, 1967

format of the tests gradually moved from individually administered, object-oriented tests to group administered, printed tests as the children became better able to comprehend and attend to printed materials and verbal directions in a group situation. Various standardized intelligence tests (one per year) were also administered by ELMA in the middle of the first three school years. Attitude scales were given in Grades 2 and 3. In addition, the results of standardized tests administered by the school systems participating in ELMA were obtained and included in the data analyses.

Test administrators were carefully chosen for each battery from graduate students and primary teachers with course work or experience in psychological testing plus experience in working with young children. All testers were required to attend training sessions before each test battery. Throughout the training sessions, emphasis was placed on the importance of careful adherence to the instructions when giving the tests.

GUIDE FOR THE USE OF THIS VOLUME

The first part of this volume contains the test batteries which were administered during the fourth year of the Elementary Mathematics Project. The Introductions to the Grade 3 Fall and Spring Test Batteries on pages 3 and 37 describe the format and information to be found in this part of the report.

The second part of this volume contains the description and statistical properties of the Grade 3 scales derived from these test batteries. Figure 1 is a sample page from this part of the report. The information for most scales is in this basic format.

A Key for explaining Figure 1 follows:

1. Grade Level and Time of Administration. Two pieces of information are indicated for each scale: (1) the grade level of the students taking the scale, and (2) whether it was given in the fall or spring.

2. Form Number. The form number of the test in which the scale is included.

3. Scale Identification Code. Each code number consists of a three-digit number. The first digit indicates when a scale was administered: "6" for the fall of the fourth year and "7" for the spring of the fourth year. The second and third digits number the scales within a test battery. For instance, scale code 704 indicates a scale from the spring, fourth year test battery which is scale number 4 from that battery. Not all code numbers used during the fourth year of the study are reported in this volume. (Those assigned for internal identification purposes are not included.)

Grade 3 (1)
Spring

(2) Form 3-02
(3) Scale 704

(4) (5)

704 APPLICATION (8 items)

(3) This scale is composed of eight story problems which are designed to measure the pupil's ability to select and perform the relevant arithmetic operations. Six of the items involve either addition or subtraction or both; one of the items involves addition and multiplication, and one deals with partitioning a set into two equivalent groups. The format for all the items in this scale is multiple choice. It is an extension of 714 and 715.

(6)

The items which make up this scale come from Form 3-02 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

(7) Items 24 - 31 Pages 59, 60

SCALE STATISTICS:

(8)	NUMBER OF CASES	=	705
(5)	NUMBER OF ITEMS	=	8
(9)	MEAN TOTAL SCORE	=	4.980
(10)	STANDARD DEVIATION	=	2.054
(11)	CRONBACH'S ALPHA	=	0.669
(12)	ERROR OF MEASUREMENT	=	1.181

ITEM STATISTICS:

(13) ITEM	(14) P'S	(15) ADJ. P'S	(16) N.S. BIS	(17) PERCENT NT
24	0.755	0.773	0.503	2.411
25	0.769	0.782	0.659	1.702
26	0.621	0.637	0.474	2.411
27	0.813	0.845	0.447	3.830
28	0.529	0.565	0.526	6.383
29	0.538	0.571	0.206	5.816
30	0.471	0.501	0.511	5.957
31	0.485	0.503	0.406	3.546

Figure 1

4. Scale Name. The scale name is usually descriptive of the content of the scale (e.g., Place Value or Application). In some cases an S (either alone or followed by a number) follows the scale name to indicate a shortened scale that includes only selected items from another scale. If only one scale within a test battery is composed of a sub-set of items, an S follows the scale name. If more than one shortened scale is reported, each new sub-set is assigned a sequential number after the S.

5. Scale Length and Sub-Group Information. The number of items in the scale is indicated in parentheses following the scale name. This number is also reported in the second line under the Scale Statistics. If the scale was administered to less than the entire population, the nature of the sub-group is indicated.

6. Scale Description. A brief description of the scale is given, telling what the scale is designed to measure, and giving any special information about the scale. In particular, cross-referencing is given to other scales that are the same as the scale being described. This cross-referencing is done across years. If a scale is an extension or shortened form of another scale within a test battery, that information is also noted.

7. Item and Page Reference. The item numbers and the pages in the first part of this report where the items are reproduced are recorded for reference.

8. Number of Cases. The data in this volume are reported on the total number of students to whom the scale was administered in the test center which had all four cells (low income-SMSG, low income-SRA, middle income-SMSG, and middle income-SRA, i.e., City 1).

9. Mean Total Score. This is the mean for scale scores. For scales made up of dichotomous items, the scale score is the number of items correct. For attitude scales, the responses for each item are assigned values which range from 1 for the most negative response to 6 for the most positive response. This procedure includes reversal of the order of assigning values to responses (flipping) when the item stem is a negative statement. The item scores are summed to produce the scale score.

10. Standard Deviation. The standard deviation of scale scores.

11. Cronbach's Alpha. The coefficient alpha is an estimate of the internal consistency reliability of the scale.

12. Error of Measurement. The standard error of measurement of a scale is an index of the extent to which scores would vary over similar tests. It is a function of the standard deviation and alpha,

$$(\text{ERR.MEAS}) = (\text{ST.DEV}) \sqrt{(1.0 - \text{ALPHA})}.$$

It can be used to establish a confidence interval around an obtained score to estimate the region in which a true score probably lies.

13. Item. This is the number of the item for which the statistics are reported. Page references for all items in the scale are given in 7 above.

14. Item Mean. P is the mean on the item for all students in the sample.

15. Adjusted Item Mean. ADJ. P for an item is the mean for all students who attempted the item. Not tried responses eliminate the student from the calculation of ADJ. P. An item is defined as not tried if there was no response to the item.

16. Biserial (or Serial) Correlation. N.S. BIS is given as an index of item discrimination for items scored right or wrong. The serial correlation is given as an index of item discrimination for attitude (more than two response) items. The biserial correlation is a special case of the serial correlation.

In general, the biserial correlation is a correlation between a discrete variable (e.g., a test item) and a continuous variable (e.g., a total test score.)

The biserial and serial correlations given in this volume are non-spurious. That is, these correlations are between the item and the total scale score with the item removed. These non-spurious correlations are sometimes referred to as "item vs. item-remainder correlations," the correlation of the item with the remainder of the scale.

17. Percent Not Tried. The percent of students for whom the item was not tried is indicated by PERCENT NT.

TABLE OF CONTENTS

Foreword

Guide for the Use of This Volume

Page

GRADE 3 FALL TEST BATTERY - FORM 3-01

Introduction 3

General Instructions for Testers - Form 3-01 5

General Directions for Administering Group Form 3-01 7

Tester's Manual - Form 3-01 11

Form 3-01 23

GRADE 3 SPRING TEST BATTERY - FORMS 3-02, 3-03, AND 3-04

Introduction 37

Directions for Administering Form 3-02 39

Tester's Manual - Form 3-02 41

Form 3-02 51

General Instructions for Administering Forms 3-03 and 3-04 69

Tester's Manual - Form 3-03 71

Form 3-03 75

Tester's Manual - Form 3-04 89

Form 3-04 95

DESCRIPTION AND STATISTICAL PROPERTIES OF SCALES - FALL

Scoring the Grade 3 Fall Scales 113

Scale Descriptions and Statistical Properties . . . 114

DESCRIPTION AND STATISTICAL PROPERTIES OF SCALES - SPRING

Scoring the Grade 3 Spring Scales 131

Scale Descriptions and Statistical Properties . . . 132

(continued)

TABLE OF CONTENTS
(continued)

Page

APPENDICES

Appendix A - Description and Scale Statistics for Stanford Achievement Test 167

Appendix B - Formulas for Item and Scale Statistics 171

GRADE 3

FALL TEST BATTERY

FORM 3-01

INTRODUCTION

Grade 3 - Fall Testing

Form 3-01

Form 3-01 was designed to measure retention of mathematical ideas included in the Grade 2 program. The battery was given during the first week of school to a sample of the third grade students participating in the study. The sample consisted of 197 students (approximately one-fifth of the total ELMA sample). All of the students chosen for testing were from six schools in the test center which had all four cells (low income-SMSG, low income-SRA, middle income-SMSG, and middle income-SRA) active in the study. The schools were chosen so that an approximately equal number of students were in each of the four cells.

The test is made up of selected scales previously administered in the spring Grade 2 battery (Forms 2-03, 2-04, and 2-05); no new test material was presented. The battery consisted of printed, group administered test, although all items were still read by the tester as well as being printed in the booklets. Form 3-01 was administered to small groups of five or six students at a time. It took approximately 30 minutes to administer.

Because the testers were chosen from those who had previously administered the spring Grade 2 battery and because all scales used in Form 3-01 were taken from that battery, no tester training session was felt to be necessary. The directions to the testers concerning preparations for testing, general rules to follow, the tester's Manual, and Form 3-01 are reproduced on the following pages.

SCHOOL MATHEMATICS STUDY GROUP

ELEMENTARY MATHEMATICS PROJECT

FORM 3-01

Fall Inventory, 1969 --- Grade 3

General Instructions for Testers

Our purpose in testing this fall is to ascertain how much the students have forgotten during the summer vacation. Children in only a limited number of schools are to be tested. One group test will be administered. All the items in the test have been selected from the three group tests administered this spring.

Testing will begin on Thursday, September 11, and hopefully will be completed by the end of the following day, Friday, September 12. In some cases it may be necessary to finish the testing early the next week, but we are anxious that the tests be given before the students are exposed to too much review or classroom instruction.

It is essential that the testers follow exactly the same procedure in administering the tests. Read the Directions for Administering Form 3-01 carefully before the first day of testing. You will already be familiar with the instructions and with the tests, but if you should have any questions, be sure to call us collect at Stanford: 321-2300, Extension 2681. Ask for Terry Chay or Yvonne McManis.

We will notify the school principal to expect you on September 11. If for any reason you should not be able to test after all, please notify the principal and immediately call us collect to let us know.

Otherwise, you should, as always, check with the principal on your arrival at the school. You should ask the principal whether the children may return to the classroom by themselves or whether they should be accompanied by the tester. It is important that the children miss as little classroom time as possible, and should be taken or sent back to their classroom (depending on school policy) immediately after testing has been completed. Children may not leave the school grounds under any circumstances while under your supervision.

The student roster is printed in alphabetical sequence by school rather than by class, since we have no way of knowing the class structure at this time. The labeled answer booklets have been packaged in the same sequence so that you will be able to find particular booklets more easily.

When you arrive at the school for testing and check with the principal, you should ask him for the names of the third grade teachers. Consulting with each teacher or with the principal, you will be able to determine which students are in each class.

It is quite possible that some of the children on the roster have not returned to school this fall. In this case, and in the case of any absentee, please return the blank booklet with the rest, and note on the roster that the child has transferred or is absent. There is no need to return to a school to test any children that were absent on the first day of testing.

We wish to test only those students who are in the first semester of third grade. If any children have been retained in second grade or have been accelerated beyond the first semester of third grade, do not test them but note that fact too on the roster.

Please check off the name of each student on the roster as you test him. When you have completed testing, record in the box on the front page of the roster the number of hours you have spent testing. Return the roster to us as soon as you can, in the envelope provided. You will be paid at the rate of $ 6.00 per hour. The roster is, in effect, your time sheet; therefore it should be returned separately.

At the end of testing, repackage all answer booklets, blank and used, in the box in which they arrived. Use the tape we have provided to reseal it, and affix our address label over your own address. The stamps we have provided will adequately cover the cost of mailing.

We regret having to ask you to visit the post office to mail such a large package. Unfortunately the testing is on too small a scale this time to warrant the expense of a person picking up the materials at the schools.

We would appreciate a telephone call from you when you have finished testing and mailing. Sometimes the mail is slow, and we would like to know as soon as possible when testing is complete.

SCHOOL MATHEMATICS STUDY GROUP

ELEMENTARY MATHEMATICS PROJECT

FORM 3-01

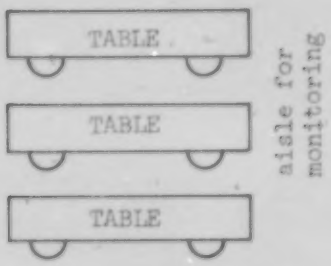
Fall Inventory, 1969 --- Grade 3

GENERAL DIRECTIONS FOR ADMINISTERING GROUP FORM 3-01

1. Setting for Administration of Test

It is important to have a separate room so that interruptions and distractions are minimized.

Seating arrangements for the group test are especially important for several reasons: first, to eliminate possibilities for copying; second, to minimize one child's distracting another; and third, to permit you more easily to monitor all of the children in the group. You will need five (or six) separate desks at which the children may work. If separate desks are not available, one alternative is to carefully space children at several long tables. These diagrams show two possible arrangements:



If the room is small and the children must work at tables, place standing folders or boxes between them as barriers. Do not have the children facing each other across tables.

Since we cannot foresee all possible problems in physical arrangements, we will rely on your ingenuity to make certain that each child's responses are independently arrived at.

2. Procedure

In general, administer this test to five children in a group. If the number of children to be tested in a given school is, for example, 32, then you can administer the test to four groups of five children each and to two groups of six children. However, in no instance give the test to a group larger than six.

In selecting the group of five children for testing, try to minimize disruption of the classroom activity. In all instances comply with the teacher's wishes in selecting the set of children to be taken for the group testing. Don't keep children out of class any longer than is necessary.

Read over, several times, the instructions for administering the test to become familiar with the items and the directions before you start testing.

The atmosphere should be as anxiety-free as possible. Set the tone by talking to the children as they enter the examination room and are being seated at prearranged desks. If the children seem anxious, assure them that we are interested in what they remember from last year but what they do will in no way affect their grades.

3. General Directions for Test Administration

The tester's manual includes all instructions that are to be read to the children. What you actually say to the child is typed in capital letters. The instructions for you, as tester, are typed in lower case. Read all the sentences (written in capital letters) to the children exactly as they are written. Keep a copy of the pupil booklet in front of you at all times as well as the tester's manual.

Directions are to be read slowly and distinctly as the tester circulates among the children. You will note that each instruction is read twice so that the tester is able to detect those children who do not understand. Allow several seconds after the final item instructions for the children to respond before going on to the next item. Make sure that all children are on the correct page before beginning instructions for that page.

Since the children's test booklets have items on facing pages (with the exception of those on pp. 13 and 15), we want to eliminate their being distracted by two pages of items exposed simultaneously. Therefore, it will be necessary for you to help each child fold his booklet under so that only the page for which you are reading instructions is exposed. Although the tester's manual may not specifically state the instructions for folding under pupil booklets on each page, these instructions are to be carried out throughout the test. Also, you are to check on each new page of items that the child has the correct page exposed.

If a child indicates that he does not know an answer, say: "MARK THE ANSWER YOU THINK IS RIGHT." However, do not insist that the child make a response.

In the event a child wants to change his response, make sure he has erased the original response before marking another.

If a child talks during testing period, the tester reminds him reassuringly that he is not to talk, that you will know which answer he thought was the correct one when you look at his booklet.

Watch the children to make sure they are answering the correct item on the correct page. If a child is recording answers in the wrong area, point to the "top", "middle" or "bottom" of the page to show him the location of the item.

Tell the children they are not to do subsequent items on a page until you tell them to do so. Repeat this statement during the test until all children have learned to wait until you have read each question to them before marking their booklets.

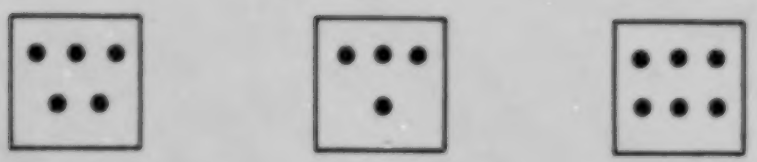
The sample page is to be used for helping the children to understand the directions, vocabulary, and format of the test to follow. Do not tell the child whether his answer is correct. The sample page is being used only to teach the child the method of marking his answers in his booklet.

4. Important Considerations

a) Do not change wording on any item. We are interested in determining if the children understand the terminology that we have used.

b) It is imperative that you monitor the children in the group testing situation by walking around and making certain that each child understands the instructions and is marking only one response to each item. Also, the monitoring will permit you to make sure that each child is working independently of the other children in the group.

(1) Which picture has three dots and one dot?



(2) Johnny has one pencil. If he loses this pencil, then how many pencils will he have?

(3) If you are counting, what number comes after two?

TESTER'S MANUAL - FORM 3-01

1. General Directions

After the children are seated, put the answer booklet for Test 3-01 in front of the child, making certain each child gets the booklet with his name label on it. Ask the children to please wait to open their booklets until you ask them to do so.

On top of the booklet, place the Sample Page for Test 3-01. (No name is needed on these.)

2. Purpose of Sample Page

The Sample Page is to be used for helping the children understand the directions, vocabulary, and format of the test to follow. Try to make certain that any questions the children may have about "top", "middle", and "bottom", "marking", "picture", "boxes", etc., are answered while doing the Sample Page.

Be sure that each child marks one and only one item in each row where there are multiple choices.

Do not tell a child whether his answer is correct. The Sample Page is being used only to teach the test format and method of marking answers in the booklet.

Do not change wording of directions on any item since many measure the child's knowledge of vocabulary.

3. Directions for Sample Page

(Have your Sample Page on top of your copy of the pupil booklet.)

EACH OF YOU HAS A PAPER ON YOUR BOOKLET. IT IS A PRACTICE PAGE.

(Hold up Sample Page. If anyone opens booklet, tell him to wait until you are all ready to work on it together.)

LOOK AT THE QUESTION AT THE TOP OF THE PAGE. DO YOU KNOW WHAT I MEAN BY 'TOP OF THE PAGE'? (Discuss and explain if there are children who do not know or seem confused by "top".)

I AM GOING TO READ THE QUESTION TO YOU. YOU ARE TO MARK THE BOX THAT BEST ANSWERS THE QUESTION. DO YOU KNOW WHAT 'MARK' MEANS? (Pause for responses and reinforce those offered. They may use any system of marking that is familiar to them, i.e., circle, cross, underline, etc.)

YES, YOU MAY (CIRCLE, ×, etc.) THE BOX THAT BEST ANSWERS THE QUESTION.

ARE YOU READY?

LISTEN CAREFULLY AS I READ QUESTION NUMBER ONE AT THE TOP OF THE PAGE AND THEN MARK YOUR ANSWER.

Sample Page

(Top) (1) WHICH PICTURE HAS THREE DOTS AND ONE DOT? (pause)

MARK THE PICTURE THAT HAS THREE DOTS AND ONE DOT. MAKE A BIG MARK THAT IS EASY TO SEE. (Pause while all children finish. Make sure each child has marked one box in the top row. Don't tell them what the correct answer is.)

(Middle) (2) NOW LOOK AT QUESTION NUMBER TWO IN THE MIDDLE OF THE PAGE, AND LISTEN CAREFULLY AS I READ.

JOHNNY HAS ONE PENCIL. IF HE LOSES THIS PENCIL, THEN HOW MANY PENCILS WILL HE HAVE? MARK THE NUMBER THAT TELLS HOW MANY PENCILS JOHNNY WILL HAVE. (pause)

(Bottom) (3) NOW LOOK AT QUESTION NUMBER THREE AT THE BOTTOM OF THE PAGE. THIS TIME YOU ARE TO WRITE THE NUMBER IN THE BOX THAT ANSWERS THE QUESTION.

THE QUESTION IS:
IF YOU ARE COUNTING, WHAT NUMBER COMES AFTER TWO?
WRITE THE NUMBER IN THE BOX. (pause)
WRITE THE NUMBER THAT COMES AFTER TWO. (pause)

DO YOU HAVE ANY OTHER QUESTION? (Pause and discuss any raised.)

I WILL READ EACH QUESTION AND YOU WILL MARK YOUR ANSWER IN THE BOOKLET BELOW THE QUESTION. PLEASE DO NOT WORK AHEAD.

NOW, OPEN YOUR BOOKLETS TO PAGE 3. (Make certain each child has turned to page 3.)

Page 3 of Pupil Booklet

(Top) (1) LOOK AT THE NUMBERS AT THE TOP OF THE PAGE.
WHICH NUMBER HAS A FIVE IN THE TENS PLACE? (pause)
MARK THE NUMBER THAT HAS A FIVE IN THE TENS PLACE. (pause)

(Middle) (2) LOOK AT THE NUMBER TWENTY-EIGHT IN THE MIDDLE OF THE PAGE.
WHICH NUMBER SHOWS HOW MANY TENS? (pause)

WRITE THE NUMBER THAT TELLS HOW MANY TENS ARE IN TWENTY-EIGHT. (pause)

(Bottom) (3) NOW LET'S GO TO THE BOTTOM OF THE PAGE. LOOK AT THE PICTURE. HOW MANY TENS ARE THERE? (pause)

WRITE THE NUMBER THAT TELLS HOW MANY GROUPS OF TEN ARE IN THE PICTURE. (pause)

TURN TO PAGE 4 (pause) NOW FOLD YOUR BOOKLETS SO THAT YOU CAN ONLY SEE PAGE 4.

(Demonstrate with your booklet while making preceding statement. Help each child to fold pages at spine. Make sure each child has Page 4 showing.)

Page 4 of Pupil Booklet

(Top) (4) LOOK AT THE NUMBER THIRTY-SEVEN AT THE TOP OF THE PAGE. WHICH NUMBER IS IN THE ONES PLACE? (pause)

WRITE THE NUMBER THAT TELLS HOW MANY ONES. (pause)

(Middle) (5) LOOK AT THE NUMBERS IN THE MIDDLE OF THE PAGE. WHICH NUMBER IS THREE HUNDRED THREE? (pause)

MARK THE NUMBER THAT IS THREE HUNDRED THREE. (pause)

(Bottom) (6) LOOK AT THE NUMBERS AT THE BOTTOM OF THE PAGE. WRITE A NUMBER IN THE BOX TO MAKE THE SENTENCE TRUE. (pause)

WRITE A NUMBER IN THE BOX TO MAKE THE SENTENCE CORRECT. (pause)

TURN YOUR BOOKLETS OVER SO THAT YOU CAN SEE PAGE 5.

(Check each child to make sure he has Page 5 showing.)

Page 5 of Pupil Booklet

(Top) (7) LOOK AT THE NUMBERS AT THE TOP OF THE PAGE. WHICH OF THESE IS A NAME FOR TEN TENS? (pause)

MARK THE NUMBER THAT IS A NAME FOR TEN TENS. (pause)

(Middle) (8) LOOK AT THE NUMBERS IN THE MIDDLE OF THE PAGE. WHICH OF THESE IS A NAME FOR SIX TENS AND THIRTEEN ONES? (pause)

MARK THE NUMBER THAT IS A NAME FOR SIX TENS AND THIRTEEN ONES. (pause)

NOW TURN TO PAGE 6

IF YOU NEED THINGS TO COUNT, USE YOUR FINGERS, OR MAKE MARKS ON THE PAGE.

(Make sure each child turns to Page 6, folds his booklet, and has Page 6 showing.)

Page 6 of Pupil Booklet

(Top) (9) LOOK AT THE STORY AT THE TOP OF THE PAGE AND LISTEN TO THE STORY. THEN MARK THE NUMBER THAT ANSWERS THE QUESTION.

THE STORY IS: TONY HAD SOME BLOCKS. DAVID GAVE HIM FOUR MORE BLOCKS. NOW TONY HAS SEVEN BLOCKS.

HOW MANY BLOCKS DID TONY HAVE BEFORE DAVID GAVE HIM MORE? (pause)

TONY HAD SOME BLOCKS. DAVID GAVE HIM FOUR MORE BLOCKS. NOW TONY HAS SEVEN BLOCKS. HOW MANY BLOCKS DID TONY HAVE BEFORE DAVID GAVE HIM MORE?

MARK THE NUMBER THAT TELLS HOW MANY BLOCKS TONY HAD BEFORE DAVID GAVE HIM MORE. (pause)

(Middle) (10) LOOK AT THE STORY IN THE MIDDLE OF THE PAGE AND THE NUMBERS BELOW THE STORY. LISTEN CAREFULLY WHILE I READ YOU THE STORY IN THE MIDDLE OF THE PAGE. (pause)

JOHN HAD SOME PENNIES. HE LOST THREE OF THEM. NOW HE HAS FOUR PENNIES. HOW MANY PENNIES DID JOHN HAVE BEFORE HE LOST ANY?

MARK THE NUMBER THAT TELLS HOW MANY PENNIES JOHN HAD BEFORE HE LOST ANY. (pause)

(Bottom) (11) LOOK AT THE STORY AND THE NUMBERS AT THE BOTTOM OF THE PAGE.

NOW LISTEN TO THE STORY. (pause)

BILL HAS FIVE PENCILS. JOHN HAS THREE PENCILS. HOW MANY MORE PENCILS DOES BILL HAVE THAN JOHN? (pause)

BILL HAS FIVE PENCILS. JOHN HAS THREE PENCILS. BILL HAS MORE PENCILS THAN JOHN. HOW MANY MORE PENCILS DOES BILL HAVE THAN JOHN?

MARK THE NUMBER THAT TELLS HOW MANY MORE PENCILS BILL HAS THAN JOHN. (pause)

NOW TURN TO PAGE 7. (pause)

Page 7 of Pupil Booklet

(Top) (12) LOOK AT THE STORY AND THE NUMBERS AT THE TOP OF THE PAGE.

THE STORY IS: MRS. JONES BOUGHT SIX EGGS. SHE USED ONE-HALF OF THE EGGS TO MAKE A CAKE. HOW MANY EGGS DID SHE USE? (pause)

MRS. JONES BOUGHT SIX EGGS. SHE USED ONE-HALF THE EGGS TO MAKE A CAKE. HOW MANY EGGS DID SHE USE?

MARK THE NUMBER THAT TELLS HOW MANY EGGS MRS. JONES USED. (pause)

(Middle) (13) LOOK AT THE STORY AND THE NUMBERS IN THE MIDDLE OF THE PAGE.

THE STORY IS: SUE PUT FOUR ROUND COOKIES, SEVEN SQUARE COOKIES, AND FIVE LONG COOKIES IN THE COOKIE JAR. HOW MANY COOKIES IN ALL DID SHE PUT IN THE JAR? (pause)

SUE PUT FOUR ROUND COOKIES, SEVEN SQUARE COOKIES, AND FIVE LONG COOKIES IN THE COOKIE JAR. HOW MANY COOKIES IN ALL DID SHE PUT IN THE JAR?

MARK THE NUMBER THAT TELLS HOW MANY COOKIES IN ALL SUE PUT IN THE JAR. (pause)

(Bottom) (14) LOOK AT THE STORY AND THE NUMBERS AT THE BOTTOM OF THE PAGE.

THE STORY IS: BOB HAD FORTY-EIGHT MARBLES. HE TRADED TWENTY-ONE OF THEM FOR A TOY. HOW MANY MARBLES DOES HE HAVE LEFT? (pause)

BOB HAD FORTY-EIGHT MARBLES. HE TRADED TWENTY-ONE OF THEM FOR A TOY. HOW MANY MARBLES DOES HE HAVE LEFT?

MARK THE NUMBER THAT TELLS HOW MANY MARBLES BOB HAS LEFT. (pause)

NOW TURN YOUR BOOKLETS OVER SO THAT YOU CAN SEE PAGE 8.

Page 8 of Pupil Booklet

(Top) (15) LOOK AT THE STORY AND THE NUMBERS AT THE TOP OF THE PAGE.

THE STORY IS: JIM HAD NINETEEN ACORNS. HE GAVE FIFTEEN OF THEM TO GORDON. THEN HE FOUND TWENTY-FOUR MORE ACORNS. HOW MANY ACORNS DID JIM HAVE THEN? (pause)

JIM HAD NINETEEN ACORNS. HE GAVE FIFTEEN OF THEM TO GORDON. THEN HE FOUND TWENTY-FOUR MORE ACORNS. HOW MANY ACORNS DID JIM HAVE THEN?

MARK THE NUMBER THAT TELLS HOW MANY ACORNS JIM HAD AT THE END. (pause)

(Middle) (16) LOOK AT THE STORY IN THE MIDDLE OF THE PAGE. NOW LISTEN TO THE STORY.

JACK HAD FIFTY CENTS. HE BOUGHT A PENCIL FOR EIGHT CENTS AND A BALL FOR TEN CENTS. HOW MANY CENTS DID HE HAVE LEFT? (pause)

JACK HAD FIFTY CENTS. HE BOUGHT A PENCIL FOR EIGHT CENTS AND A BALL FOR TEN CENTS. HOW MANY CENTS DID HE HAVE LEFT? MARK THE NUMBER THAT SHOWS HOW MANY CENTS JACK HAD LEFT. (pause)

NOW TURN TO PAGE 9.

Page 9 of Pupil Booklet

(Top) (17) LOOK AT THE PICTURE AT THE TOP OF THE PAGE. 'WHICH PICTURE BELOW HAS FEWER DOTS THAN THE PICTURE AT THE TOP?' (pause)

MARK THE PICTURE WHICH HAS FEWER DOTS THAN THE PICTURE AT THE TOP OF THE PAGE. (pause)

(Middle) (18) LOOK AT THE NUMBERS IN THE MIDDLE OF THE PAGE. 'WHICH NUMBER IS BETWEEN FOUR AND SEVEN?' (pause)

MARK THE NUMBER THAT IS BETWEEN FOUR AND SEVEN. (pause)

(Bottom) (19) LOOK AT THE NUMBERS AT THE BOTTOM OF THE PAGE. 'WHICH MEANS THE LEAST NUMBER OF THINGS?' (pause)

MARK THE NUMBER THAT MEANS THE LEAST NUMBER OF THINGS. (pause)

TURN TO PAGE 10. (Make sure everyone has turned to page 10.)

Page 10 of Pupil Booklet

(Top) (20) LOOK AT THE BOX AT THE TOP OF THE PAGE. LISTEN TO THE STORY, THEN WRITE YOUR ANSWER IN THE BOX.

'JOHN WAS THE 6TH CHILD TO CROSS THE BRIDGE. HOW MANY CROSSED BEFORE HE DID?'

WRITE THE NUMBER IN THE BOX. (pause)

JOHN WAS THE 6TH CHILD TO CROSS THE BRIDGE. HOW MANY CROSSED BEFORE HE DID?

WRITE THE NUMBER IN THE BOX AT THE TOP OF THE PAGE. (pause)

(Middle) (21) LOOK AT THE BOX IN THE MIDDLE OF THE PAGE AND LISTEN TO THE STORY.

'I SIT IN THE 2ND SEAT. YOU SIT IN THE 5TH SEAT. HOW MANY SEATS ARE THERE BETWEEN US?

WRITE THE NUMBER IN THE BOX. (pause)

I SIT IN THE 2ND SEAT. YOU SIT IN THE 5TH SEAT. HOW MANY SEATS ARE THERE BETWEEN US?

WRITE THE NUMBER IN THE BOX IN THE MIDDLE OF THE PAGE. (pause)

(Bottom) (22) LOOK AT THE BOX AT THE BOTTOM OF THE PAGE.

'WE ARE FILLING SIX BOXES WITH BOOKS. WE HAVE FILLED THE 4TH BOX. HOW MANY MORE BOXES ARE THERE TO FILL?'

WRITE THE NUMBER IN THE BOX AT THE BOTTOM OF THE PAGE. (pause)

WE ARE FILLING SIX BOXES WITH BOOKS. WE HAVE FILLED THE 4TH BOX. HOW MANY MORE BOXES ARE THERE TO FILL?

WRITE THE NUMBER IN THE BOX AT THE BOTTOM OF THE PAGE. (pause)

NOW TURN TO PAGE 11. (Make sure everyone is looking at Page 11.)

Page 11 of Pupil Booklet

(Top) (23) LOOK AT THE NUMBERS AT THE TOP OF THE PAGE. 'SUPPOSE THESE NUMBERS WERE PUT IN ORDER. WHICH NUMBER WOULD BE IN THE MIDDLE?'

WRITE THE NUMBER IN THE BOX. (pause)

WRITE THE NUMBER WHICH WOULD BE IN THE MIDDLE IF THESE NUMBERS WERE PUT IN ORDER. (pause)

(Middle) (24) LOOK AT THE PICTURES OF THE CHILDREN.

'WHICH OF THESE CHILDREN IS NEXT TO THE LAST IN LINE? (pause)

MARK THE CHILD THAT IS NEXT TO LAST IN LINE. (pause)

Pages 13-15

PUT YOUR PENCILS DOWN AND LOOK THIS WAY. Get the attention of all pupils before continuing. Hold the page of symbols (+, -, ×) so that it is visible to all children.

YOU ARE GOING TO WORK THE REST OF THE BOOKLET BY YOURSELVES. Point to the subtraction sign, "-", while saying...

WATCH FOR THIS SIGN; IT TELLS YOU WHAT TO DO TO FIND THE MISSING NUMBER IN EACH EXAMPLE. IF YOU NEED THINGS TO COUNT, USE YOUR FINGERS OR MAKE MARKS ON THE PAGE.

IF YOU COME TO AN EXAMPLE YOU DON'T KNOW HOW TO DO, GO ON TO THE NEXT ONE. WORK ALL THE EXAMPLES YOU KNOW HOW TO DO. WHEN YOU FINISH THE FIRST PAGE, TURN TO THE NEXT ONE. ARE THERE ANY QUESTIONS?

(If there are questions, repeat any of the above instructions appropriate to the questions.)

NOW, TURN TO PAGE 13 IN YOUR BOOKLET AND BEGIN.

If any child is concerned that Page 12 has been omitted, mention that the blank pages have not been numbered. You are to circulate among the children as they work the computation examples. If any questions arise, you may repeat any of the above instructions. No further hints are to be given. Remind the pupils to continue working until they have completed the booklets.

SCHOOL
MATHEMATICS
STUDY GROUP

ELEMENTARY MATHEMATICS

FORM 3-01

Name of tester_____

Date test given_____

Cedar Hall, Stanford University
Stanford, California

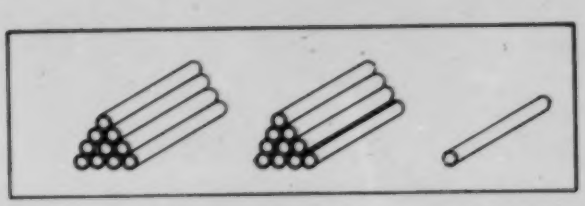
(1) Which number has a five in the tens place?

15	5	51

28

(2) Which number shows how many tens?

(3)



Look at the picture. How many tens are there?

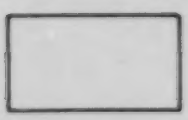
37

(4) Which number is in the ones place?

(5) Which number is three hundred three?

3003 330 303

(6) Write a number in the box to make the sentence true.

125 = 100 +  + 5

(7) Which of these is a name for ten tens?

100	110	1010

(8) Which of these is a name for six tens and thirteen ones?

613	73	19

(9) Tony had some blocks. David gave him four more blocks. Now Tony has seven blocks. How many blocks did Tony have before David gave him more?

3	4	5	6

(10) John had some pennies. He lost three of them. Now he has four pennies. How many pennies did John have before he lost any?

3	5	7	4

(11) Bill has five pencils. John has three pencils. How many more pencils does Bill have than John?

1	3	5	2

(12) Mrs. Jones bought six eggs. She used one-half of the eggs to make a cake. How many eggs did she use?

2	3	4

(13) Sue put 4 round cookies, 7 square cookies, and 5 long cookies in the cookie jar. How many cookies in all did she put in the jar?

11	12	15	16

(14) Bob had 48 marbles. He traded 21 of them for a toy. How many marbles does he have left?

27	29	67	69

(15) Jim had 19 acorns. He gave 15 of them to Gordon. Then he found 24 more acorns. How many acorns did Jim have then?

4	28	38	58

(16) Jack had fifty cents. He bought a pencil for eight cents and a ball for ten cents. How many cents did he have left?

32	38	42	48

(17)

Which picture below has fewer dots than the picture at the top?

(18) Which number is between four and seven?

8	6	3

(19) Which means the least number of things?

12	9	2	53

(20) John was the 6th child to cross the bridge.
How many crossed before he did?

---

(21) I sit in the 2nd seat. You sit in the 5th seat.
How many seats between us?

---

(22) We are filling 6 boxes with books. We have filled the 4th box.
How many more to fill?

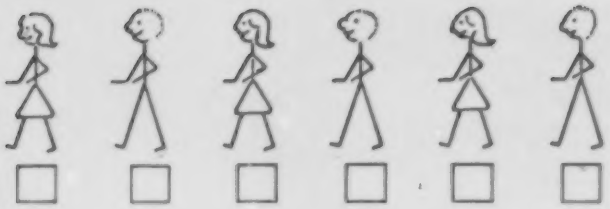
(23) **4 17 84 9 21**

Suppose these numbers were put in order.

Which number would be in the middle?

---

(24)



Which of these children is next to the last in line?

FIND THE DIFFERENCES

(25)

6 - 0 = _____

(26)

80 - 20 = _____

(27)

$$\begin{array}{r} 76 \\ -\,24 \\ \hline \end{array}$$

(28)

13 - 5 = _____

FIND THE DIFFERENCES

(29)

10 - 6 = _____

(30)

82 - 45 = _____

(31)

633
- 40

(32)

11 - 3 = _____

GRADE 3

SPRING TEST BATTERY

FORMS 3-02, 3-03, and 3-04

INTRODUCTION

Grade 3 - Spring Testing

Forms 3-02, 3-03, and 3-04

The scales in the Grade 3 spring tests were designed to measure both mathematics achievement and student attitudes toward mathematics. The battery was administered to the entire ELMA population in small groups of five or six students at a time. The tests were printed in booklets, although all items containing verbal information were still read by the tester as well as being printed in the booklets.

Form 3-02 was administered in April and Forms 3-03 and 3-04 were administered during the last two weeks of May. Because all testers had previously administered the spring Grade 2 and fall Grade 3 batteries, no tester training session was felt to be necessary. The directions to the testers concerning preparations for testing, general rules to follow, the tester's Manual, and the test forms are reproduced on the following pages. The tests have been reproduced exactly as they were given with one exception. In the original 3-03 booklets, the items were printed only on the right-hand page, leaving the left page blank. In this report, Form 3-03 is printed on both pages.

SCHOOL MATHEMATICS STUDY GROUP

ELEMENTARY MATHEMATICS PROJECT

FORM 3-02

Spring Inventory, 1969 --- Grade 3

GENERAL DIRECTIONS FOR ADMINISTERING GROUP FORM 3-02

1. Setting for Administration of Test

It is important to have a separate room so that interruptions and distractions are minimized. Seating arrangements for the children should minimize one child's distracting another, maximize independent work, and facilitate monitoring all children in the group.

2. Procedure

In general, administer this test to five children in a group. In no instance is the test to be given to a group larger than six. In selecting a group for testing, try to minimize disruption of classroom activity. In all instances, comply with the teacher's wishes in selecting the set of children to be taken for the group testing.

The atmosphere should be as anxiety-free as possible. Set the tone by talking to the children as they enter the examination room and are being seated at prearranged desks. If the children seem anxious, assure them that we are interested in what they are learning in school, but what they do will in no way affect their grades.

The tester's manual includes all instructions that are to be read to the children. What you actually say to the children is typed in capital letters. The instructions for you, as tester, are typed in lower case.

The actual test items are not reproduced in the manual and are to be read from the pupil's booklet (Form 3-02). Read each question (statement, story, etc.) to the children exactly as it is printed in the pupil's booklet. Do not change the wording on any item. We are interested in determining if the children understand the terminology we have used.

It will be necessary for you to keep the pupil booklet in front of you at all times as well as the tester's manual. So that handling both will go smoothly, before you go to the school to start testing, read over several times the instructions for administering the test to become familiar with the items and directions.

3. General Directions for Test Administration

a. Remind pupils not to talk during testing.

b. Tell the children they are not to turn the pages or do subsequent items on a page until you tell them to do so.

c. Continually monitor pupils to ensure that they are working on the correct page and problem and choosing not more than one answer per question.

d. Each question (statement, story, etc.) is to be read twice.

e. Allow time for pupils' responses after reading each question.

f. If a pupil says he doesn't know the answer, you may suggest he mark the answer he thinks is correct, but don't insist upon a response.

g. It is of no consequence if a pupil marks an actual answer rather than the letter corresponding to the answer.

h. The general procedure for administering each item is:

1. identify the item; e.g., "QUESTION NUMBER TWO IS:";

2. read (twice) the text of the item as it is printed in the booklet;

3. allow time for pupil responses.

TESTER'S MANUAL - FORM 3-02

1. General Directions

Pupils are not to open test booklets until after you have demonstrated the procedure to be used during testing. When the pupils are seated, distribute the labeled test booklets (Form 3-02). Ask the children to leave the unopened booklets on the table (desk) until you are ready to begin. After all pupils have received their booklets, hold your booklet in a position that is easily visible to the children and open it to the Sample Page. Be sure you have the attention of all pupils before proceeding.

2. Directions for Sample Page

THE FIRST PAGE OF YOUR BOOKLET, PAGE 3, LOOKS LIKE THIS. IT IS A SAMPLE PAGE AND WE WILL USE IT FOR PRACTICE. BELOW EACH QUESTION IS A PLACE FOR YOU TO MARK OR WRITE YOUR ANSWER.

SOME QUESTIONS, LIKE THESE (point to questions A, B, D and their answer choices), HAVE ANSWER CHOICES GIVEN. FOR THESE KINDS OF QUESTIONS, CHOOSE THE ONE ANSWER YOU THINK IS CORRECT, THEN MARK THE LETTER BESIDE IT BY PUTTING AN × THROUGH IT, LIKE THIS.

(Demonstrate marking the letter corresponding to an answer. This is only to make sure the students know what is meant by "mark." If a student circles the letter or marks it in some other way, this is all right.)

OTHER QUESTIONS, LIKE THIS ONE (point to question C and the empty box), HAVE EMPTY BOXES BELOW THEM. FOR THESE KINDS OF QUESTIONS, WRITE YOUR ANSWER IN THE BOX.

NOW LET'S ANSWER THE QUESTIONS ON THE SAMPLE PAGE TOGETHER. OPEN YOUR BOOKLETS TO PAGE 3, AND LISTEN CAREFULLY AS I READ THE FIRST QUESTION.

Sample Page of Pupil Booklet

(Read question A.)

LOOK AT THE ANSWER CHOICES BELOW THE QUESTION AND CHOOSE THE ONE YOU THINK IS CORRECT.

MARK THE LETTER BESIDE IT. (pause)

(Children may need individual assistance at this point. Look to see that each child has responded correctly to instruction; however, do not tell him whether or not his choice is correct. If a pupil is concerned that he marked the actual answer rather than its corresponding letter, you may remind him to mark the letter next time. The important thing is that he mark no more than one answer for each question. In the event a child wants to change his response, make sure he has erased the original response before marking another.)

NOW LISTEN TO THE NEXT QUESTION. (Read question B.) CHOOSE THE PICTURE YOU THINK IS CORRECT, THEN MARK THE LETTER BESIDE IT. (pause)

THE NEXT QUESTION HAS AN EMPTY BOX BELOW IT. LISTEN CAREFULLY TO THE STORY, THEN WRITE YOUR ANSWER IN THE BOX. (Read question C.)

THE LAST QUESTION IS: (Read question D.) CHOOSE THE SHAPE THAT LOOKS LIKE A CIRCLE, THEN MARK THE LETTER BESIDE IT. (pause)

NOW WE HAVE FINISHED THE SAMPLE PAGE. DO YOU UNDERSTAND HOW YOU ARE TO ANSWER THE QUESTIONS?

(Before proceeding, make sure the pupils understand the procedure they are to follow in answering the questions and remind them to choose only one answer.)

TURN TO PAGE 4, AND LISTEN CAREFULLY TO THE QUESTIONS.
(Remember to read each question two times.)

Page 4 of Pupil Booklet

QUESTION NUMBER ONE IS: (Read #1.)
CHOOSE YOUR ANSWER AND MARK THE LETTER BESIDE IT. (pause)

QUESTION NUMBER TWO IS: (Read #2.)
CHOOSE YOUR ANSWER AND MARK THE LETTER BESIDE IT. (pause)

LISTEN TO QUESTION NUMBER THREE: (Read #3.)
WRITE YOUR ANSWER IN THE BOX. (pause)

NUMBER FOUR. (Read #4.)
WRITE YOUR ANSWER IN THE BOX. (pause)

NUMBER FIVE. (As you read #5 indicate to each pupil the set of numbers being referred to.)
WRITE YOUR ANSWER IN THE BOX. (pause)

NOW LOOK AT THE NEXT PAGE. (Page 5)

Page 5 of Pupil Booklet

LISTEN CAREFULLY TO QUESTION NUMBER SIX: (Read #6.)
MARK THE LETTER BESIDE THE ANSWER YOU CHOOSE. (pause)

NUMBER SEVEN: (Read #7.)
CHOOSE YOUR ANSWER, THEN MARK THE LETTER BESIDE IT.
(pause)
NUMBER EIGHT: (Read #8.)
MARK THE LETTER BESIDE YOUR ANSWER. (pause)

(By now, pupils should be familiar with the procedure and need only occasional prompting to mark the letter corresponding to their answer choices. If students ask whether they should mark the letter beside the figures or those below, tell them it makes no difference as long as they mark only one answer choice.)

TURN TO THE NEXT PAGE (Page 6).

Page 6 of Pupil Booklet

QUESTION NUMBER NINE: (Read #9.) MARK YOUR ANSWER. (pause)
THE NEXT QUESTION IS: (Read #10.)
WRITE YOUR ANSWER IN THE BOX. (pause)

NUMBER ELEVEN: (Indicate the picture as you read #11.)
WRITE YOUR ANSWER IN THE BOX. (pause)

THE LAST QUESTION IS: (Read #12.)
WRITE YOUR ANSWER IN THE BOX. (pause)

LOOK AT THE NEXT PAGE (Page 7).

Page 7 of Pupil Booklet

QUESTION THIRTEEN: (Read #13.) MARK YOUR ANSWER. (pause)
FOURTEEN: (Read #14.) WRITE YOUR ANSWER IN THE BOX. (pause)
FIFTEEN: (Read #15.) MARK THE ANSWER YOU THINK IS CORRECT. (pause)

SIXTEEN: (Read #16.) MARK YOUR ANSWER. (pause)

TURN TO PAGE 8.

Page 8 of Pupil Booklet

THERE ARE SOME NUMBER LINES ON THIS PAGE.
YOU ARE TO WRITE A NUMBER IN EACH EMPTY BOX.

LOOK AT LINE SEVENTEEN. WRITE THE NUMBER THAT GOES IN THE EMPTY BOX. (pause)

NOW WRITE THE NUMBER THAT GOES IN THE EMPTY BOX. ON LINE EIGHTEEN. (pause)

FILL IN THE BOX ON LINE NINETEEN. (pause)

NOW FILL IN THE BOX ON LINE TWENTY. (pause)

LOOK AT THE NEXT PAGE (Page 9).

Page 9 of Pupil Booklet

QUESTION NUMBER TWENTY-ONE: (Read #21.)
MARK YOUR ANSWER. (pause)

NUMBER TWENTY-TWO: (Read #22.)
DRAW ARROWS ON THE LINE TO SHOW 3 + 5 = 8. (pause)

NUMBER TWENTY-THREE: (Read #23.)
MARK YOUR ANSWER. (pause)

(If students ask whether to mark the letters or the boxes, tell them it makes no difference as long as they mark only one answer choice.)

TURN TO THE NEXT PAGE (Page 10).

Page 10 of Pupil Booklet

LISTEN CAREFULLY TO EACH STORY ON THIS PAGE, THEN MARK YOUR ANSWER.

THE FIRST STORY IS: (Read #24.)

THE NEXT STORY IS: (Read #25.)

NOW STORY NUMBER TWENTY-SIX: (Read #26.)

THE LAST STORY IS: (Read #27.)

LOOK AT THE NEXT PAGE (Page 11).

Page 11 of Pupil Booklet

LISTEN TO EACH STORY ON THIS PAGE, THEN MARK YOUR ANSWER.

THE FIRST STORY IS: (Read #28.)

THE NEXT STORY IS: (Read #29.)

STORY NUMBER THIRTY IS: (Read #30.)

THE LAST STORY IS: (Read #31.)

TURN TO THE NEXT PAGE (Page 12).

Page 12 of Pupil Booklet

EACH QUESTION ON THIS PAGE HAS A PICTURE THAT GOES WITH IT. LISTEN TO THE QUESTION, LOOK AT THE PICTURE, THEN MARK YOUR ANSWER.

(continued)

Page 12 of Pupil Booklet (continued)

QUESTION NUMBER THIRTY-TWO: (Read #32.)

NUMBER THIRTY-THREE: (Read #33.)

THIRTY-FOUR: (Read #34.)

THIRTY-FIVE: (Read #35.)

LOOK AT THE NEXT PAGE (Page 13).

Page 13 of Pupil Booklet

QUESTION NUMBER THIRTY-SIX IS: (Read #36.)
MARK YOUR ANSWER. (pause)

NUMBER THIRTY-SEVEN IS: (Read #37.)

THIRTY-EIGHT: (Read #38.) MARK YOUR ANSWER. (pause)

THE LAST QUESTION IS: (Read #39.)
MARK YOUR ANSWER. (pause)

TURN TO THE NEXT PAGE (Page 14).

(Items 40 through 47 deal with geometry, which some children may not have covered in class. If the students become upset when they see them, reassure them that these problems may not be familiar to them and encourage them just to do the best they can.)

Page 14 of Pupil Booklet

NUMBER FORTY: (Read #40.) MARK YOUR ANSWER. (pause)

QUESTION NUMBER FORTY-ONE: (Read #41 and the answer choices.) MARK THE ANSWER YOU THINK IS CORRECT. (pause)

THE LAST QUESTION IS: (Read #42. Give help, if needed, in reading answer choice D.) MARK YOUR ANSWER. (pause)

LOOK AT THE NEXT PAGE (Page 15).

Page 15 of Pupil Booklet

NUMBER FORTY-THREE: (Indicate the shape being referred to as you read #43.) MARK YOUR ANSWER. (pause)

FORTY-FOUR: (Read #44 and the answer choices.) CHOOSE THE ANSWER YOU THINK IS CORRECT. (pause)

FORTY-FIVE: (Indicate the shapes being referred to as you read #45 and its answer choices.) MARK YOUR ANSWER. (pause)

TURN TO THE NEXT PAGE (Page 16).

Page 16 of Pupil Booklet

LOOK AT THE PICTURE BESIDE QUESTION NUMBER FORTY-SIX. (Read #46.) MARK YOUR ANSWER. (pause)

QUESTION NUMBER FORTY-SEVEN IS: (Read #47.) MARK YOUR ANSWER. (pause)

DO NOT TURN TO THE NEXT PAGE JUST YET. LEAVE YOUR BOOKLETS AS THEY ARE, AND LET'S TAKE SOME TIME TO STRETCH BEFORE GOING ON.

(Allow the children two or three minutes to move about, but do not let them run around the room.)

ALL RIGHT, NOW LET'S GO BACK TO SOMETHING DIFFERENT IN THE BOOKLETS. LEAVE YOUR BOOKLETS AS THEY ARE -- DO NOT TURN THE PAGE.

(Get the attention of all pupils before continuing. Hold the page of symbols (+, -, ×) so that it is visible to all children.)

YOU ARE GOING TO WORK THE REST OF THE PROBLEMS BY YOURSELVES.

(Point to each of the signs, "+, -, ×", while saying ...)

WATCH FOR THESE SIGNS; THEY TELL YOU WHAT TO DO TO FIND THE MISSING NUMBER IN EACH EXAMPLE. IF YOU NEED THINGS TO COUNT, USE YOUR FINGERS OR MAKE MARKS ON THE PAGE.

YOU MAY NOT HAVE BEEN TAUGHT HOW TO WORK SOME EXAMPLES. IF YOU COME TO AN EXAMPLE YOU DON'T KNOW HOW TO DO, GO ON TO THE NEXT ONE. WORK ALL THE EXAMPLES YOU KNOW HOW TO DO. WHEN YOU FINISH ONE PAGE, TURN TO THE NEXT. ARE THERE ANY QUESTIONS?

(If there are questions, repeat any of the above instructions appropriate to the questions.)

REMEMBER (point to symbols again), WATCH FOR THESE SIGNS, AND WORK ALL THE EXAMPLES YOU KNOW HOW TO DO. NOW, TURN TO THE NEXT PAGE IN YOUR BOOKLET AND BEGIN.

Pages 18-20 of Pupil Booklet

(You are to circulate among the children as they work the computation examples. If any questions arise, you may repeat any of the above instructions. No further hints are to be given. Remind the pupils to continue working until they have completed the booklets, pointing out that there are three pages of problems.)

(In order to keep the children who may finish early from disturbing those who are still working, we have provided you with some activity pages. You should carry them with you as you circulate among the children. When a child has finished his answer booklet, and you have checked to see that he has completed all three pages, remove his booklet and give him the activity pages. These activities, hopefully, will keep the faster children occupied while slower workers complete their booklets. The children may keep these pages. Slower children should be given a set of activity pages to take with them after they have completed their booklets.)

SCHOOL
MATHEMATICS
STUDY GROUP

FORM 3-02

Name of Tester_____

Date Test Given_____

Cedar Hall
Stanford University
Stanford, California

(A) When you are counting, what number comes after four?

(A) 3
(B) 4
(C) 5
(D) 6

(B) Which picture has three dots?

(A)

(B)

(C)

(C) Jim is five years old. His sister is one year older. How old is Jim's sister?

(D) Which shape looks most like a circle?

(A)

(B)

(C)

(D)

(1) Which number is between four and seven?

(A) 8
(B) 6
(C) 3

(2) Which means the least number of things?

(A) 12
(B) 9
(C) 2
(D) 53

(3) I sit in the 2nd seat. You sit in the 5th seat. How many seats between us?

(4) We are filling 6 boxes with books. We have filled the 4th box. How many more to fill?

(5) 4 17 84 9 21

Suppose these numbers were put in order. Which number would be in the middle?

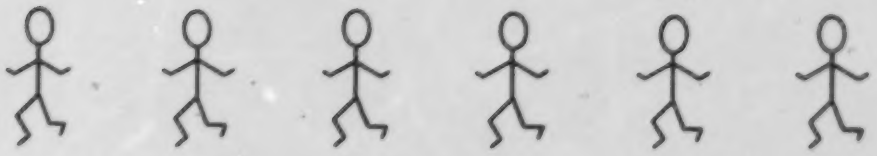
(6) Here is a row of numbers.

6 7 5 4 3

If we put these numbers in order, starting with the smallest, which would be next to the last?

(A) 3
(B) 6
(C) 7
(D) 8

(7)



How many children are there between the second child and the sixth child?

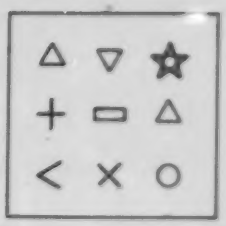
(A) 3
(B) 4
(C) 5
(D) 6

(8) Which of these arrays has a circle in the third row and the second column?

(A)

(B)

(C)



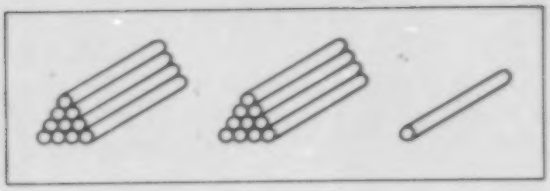
(A) A
(B) B
(C) C

(9) Which number has a five in the tens place?

(A) 15
(B) 5
(C) 51

(10) In 28, which number shows how many tens?

(11)



Look at the picture. How many tens are there?

(12) In 37, which number is in the ones place?

(13) Which number is three hundred three?

(A) 3003
(B) 330
(C) 303

(14) Write a number in the box to make the sentence true.

$$125 = 100 + \square + 5$$

(15) Which of these is a name for ten tens?

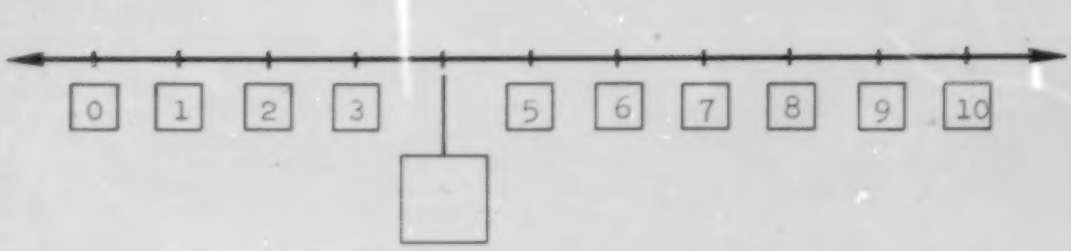
(A) 100
(B) 110
(C) 1010

(16) Which of these is a name for six tens and thirteen ones?

(A) 613
(B) 73
(C) 19

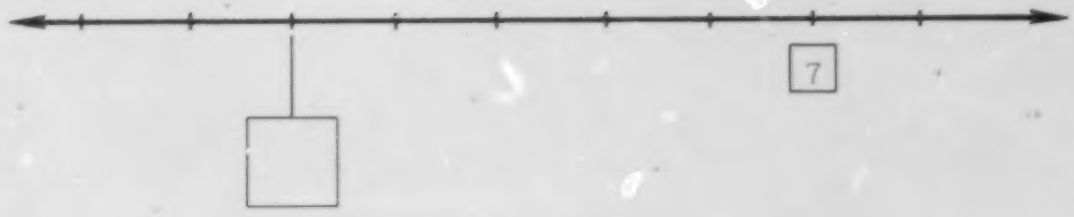
What numbers go in the empty boxes?

(17)

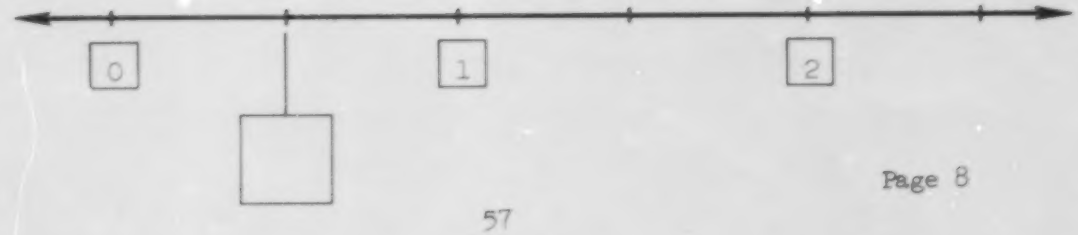


(18)

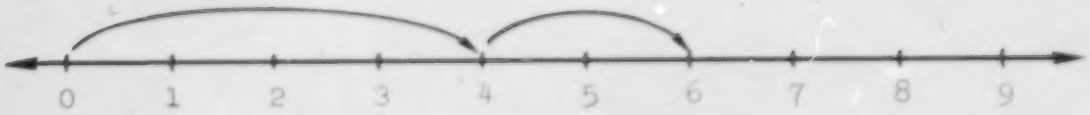
(19)



(20)

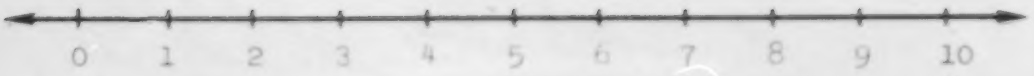


(21) Which number sentence do these arrows show?

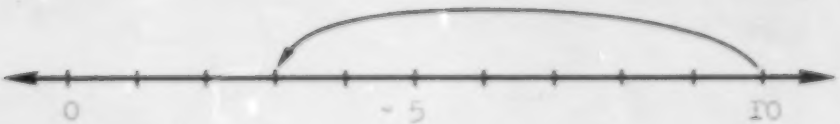


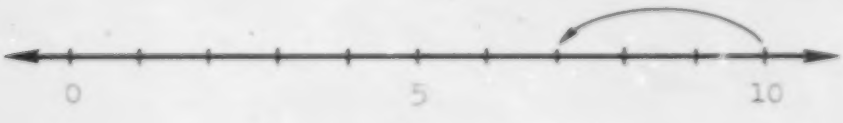
(A) 6 + 2 = 4
(B) 4 + 2 = 6
(C) 2 + 4 = 6

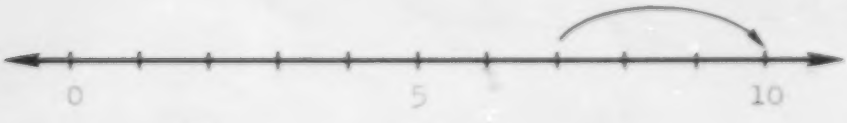
(22) Draw arrows to show 3 + 5 = 8.



(23) Which picture goes with 10 - 7 = 3?

(A)


(B)


(C)


(24) Tony had some blocks. David gave him four more blocks. Now Tony has seven blocks. How many blocks did Tony have before David gave him more?

(A) 3
(B) 4
(C) 5
(D) 6

(25) Bill has five pencils. John has three pencils. How many more pencils does Bill have than John?

(A) 1
(B) 2
(C) 3
(D) 5

(26) Mrs. Jones bought six eggs. She used one-half of the eggs to make a cake. How many eggs did she use?

(A) 1
(B) 2
(C) 3
(D) 4

(27) Bob had 48 marbles. He traded 21 of them for a toy. How many marbles does he have left?

(A) 27
(B) 29
(C) 67
(D) 69

(28) Jim had 19 acorns. He gave 15 of them to Gordon. Then he found 24 more acorns. How many acorns did Jim have then?

(A) 4
(B) 28
(C) 38
(D) 58

(29) Jack had fifty cents. He bought a pencil for eight cents and a ball for ten cents. How many cents did he have left?

(A) 32
(B) 38
(C) 42
(D) 48

(30) Ruth found 16 shells. She gave 9 of them to Tony. Then she found 13 more shells. How many shells did Ruth have then?

(A) 18
(B) 20
(C) 21
(D) 29

(31) Mary bought 2 cards of buttons and Janet bought 3 cards of buttons. Each card had 4 buttons on it. How many buttons did the girls buy altogether?

(A) 5
(B) 9
(C) 12
(D) 20

(32) What part of the picture is shaded?

(A) $\frac{1}{2}$

(B) $\frac{1}{3}$

(C) $\frac{1}{4}$

(33) What part of the line is shaded?

(A) $\frac{1}{3}$

(B) $\frac{1}{4}$

(C) $\frac{1}{5}$

(34) What number goes best with the picture?

(A) $\frac{1}{3}$

(B) $\frac{2}{3}$

(C) $\frac{3}{4}$

(35) What part of the string is shaded?

(A) $\frac{1}{2}$

(B) $\frac{1}{3}$

(C) $\frac{1}{4}$

(36) What part of the circle is shaded?

(A) $\frac{1}{3}$

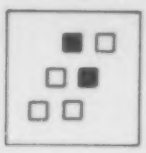
(B) $\frac{1}{2}$

(C) $\frac{1}{4}$

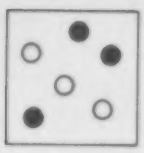
(37) Draw a ring around one-third of the dots.

(38) Which set has one-half shaded?

(A)



(B)



(C)

(39) When something is cut in fourths, how many pieces are there?

(A) 2
(B) 3
(C) 4
(D) 5

(40) Which figure shows a line segment?

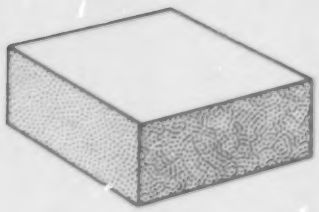
(A)

(B)

(C)

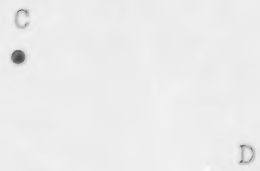
(D)

(41) Which parts of a rectangular block remind you most of a line segment?



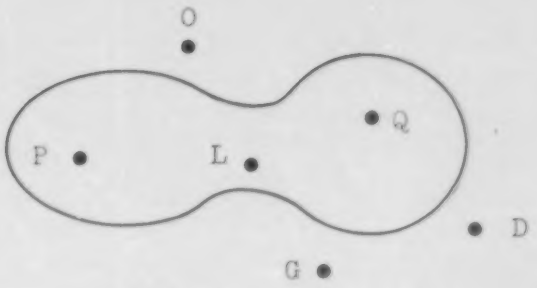
(A) The corners
(B) The edges
(C) The faces
(D) The region inside the block

(42) How many different straight lines can be drawn through points C and D?



(A) 1
(B) 2
(C) 3
(D) More than can be counted

(43) The set of points outside this shape is:

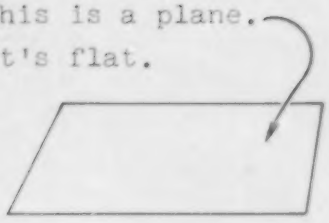


(A) {P, O, G}
(B) {G, O, Q}
(C) {D, O, G}
(D) {P, Q, L}

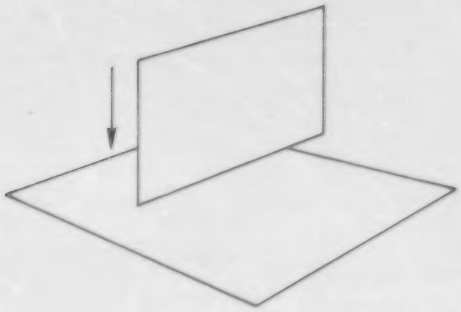
(44) Which of these objects is most like a point?

(A) The tip of your pencil
(B) An edge of your desk
(C) The edge of a penny
(D) A sheet of paper

(45) This is a plane. It's flat.



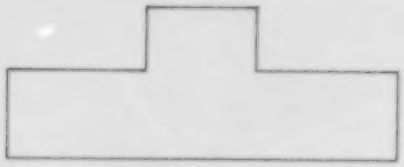
Here are two planes about to intersect.



Their intersection will be a

(A) point
(B) line
(C) plane
(D) closed curve

(46). How many line segments are in this picture?



(A) 5
(B) 6
(C) 7
(D) 8

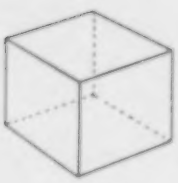
(47) Which of the following is a picture of a cylinder?

(A)

(B)

(C)

(D)



Find the Sums.

(48)

$$\begin{array}{r} 42 \\ +\ 23 \\ \hline \end{array}$$

(49)

$6 + 1 + 0 + 7 =$ _____

(50)

$$\begin{array}{r} 340 \\ +\ 277 \\ \hline \end{array}$$

(51)

$9 + 19 =$ _____

(52)

$10 + 43 + 31 =$ _____

(53)

$$\begin{array}{r} 699 \\ +\ 320 \\ \hline \end{array}$$

(54)

$$\begin{array}{r} 888 \\ +\ 444 \\ \hline \end{array}$$

(55)

$$\begin{array}{r} 2007 \\ +\ 1899 \\ \hline \end{array}$$

Find the Differences.

(56)

6 - 0 = _____

(57)

80 - 20 = _____

(58)

13 - 5 = _____

(59)

82 - 45 = _____

(60)

633
- 40

(61)

11 - 3 = _____

(62)

806
- 163

(63)

406
- 37

Find the Products.

(64)

$2 \times 3 =$ _____

(65)

$3 \times 4 =$ _____

(66)

$1 \times 12 =$ _____

(67)

$8 \times 6 =$ _____

(68)

$3 \times 7 =$ _____

(69)

$10 \times 8 =$ _____

(70)

$$\begin{array}{r} 34 \\ \times\ 2 \\ \hline \end{array}$$

(71)

$9 \times 0 =$ _____

SCHOOL MATHEMATICS STUDY GROUP

ELEMENTARY MATHEMATICS PROJECT

FORMS 3-03, 3-04

Spring Inventory, 1969 --- Grade 3

General Instructions for Testers

Forms 3-03 and 3-04 are to be administered to small groups of five or six students. Neither Form is long, and they are to be given in one testing session -- Form 3-03 followed by Form 3-04. You will observe that the first part of Form 3-04 (Items 1-39) is different from any tests previously administered, and therefore the directions will need to be studied carefully well in advance. As in the past, we will depend upon your ingenuity to see that the children's seating arrangements are such that they can do independent work and you can monitor them easily.

You will note that the answer choices for Items 1-39 in Form 3-04 are printed fairly close together. It has been our past experience that children often make too large an × or circle and cover more than one choice, thus reducing the accuracy of coding. Please make a special effort to see that only one choice is marked.

The school principals have been advised the testing will begin on May 18 and be finished by the end of the month. Since this gives us just ten testing days, it will probably be essential to plan carefully and work steadily. We do not want the testing to run over into June if this can possibly be avoided.

You will be testing in the same schools in which you administered Form 3-02. As before, an appointment has been made for you for the morning of May 18 at the first school on your list. You should telephone the remaining schools a day or two in advance of your arrival.

On Friday, May 15, John Ucolano will deliver to your home a box for each of your schools, containing the 3-03 and 3-04 test booklets, class rosters, activity sheets, and a supply of pencils. At that time he will pick up the boxes of 3-02 test booklets.

As with the April testing, as soon as your assignments are completed, please return your time sheet and the student name rosters in the enclosed manila envelope, and keep the test booklets at your home until they can be picked up. Checks will be processed and mailed as soon as all testers' time sheets have been returned.

Please telephone at the end of your second day of testing (Tuesday, May 19) to let us know how long it is taking to administer the tests, and again when you have finished your testing. You may call collect, 321-2300, Ext. 2682, and ask for either Terry Chay or Yvonne McManis.

TESTER'S MANUAL - FORM 3-03

General Directions

The first page of test booklet Form 3-03 is a Sample Page to be used to explain the test items and familiarize the children with the format. Because the children may be predisposed to oral responses, you should use the Sample Page to stress that the children are to mark their responses on the page rather than "tell" them. Additionally, you should stress that people feel differently about things, that they don't always like the same things.

If a child wants to change his response, make sure he has erased the original response before marking another.

You may repeat the directions on any item if the children do not seem to understand or have questions.

Before the test booklets are opened, you should have about a one-minute dialogue with the children to explain what the test is about. The main point of the dialogue is to convey the idea that people have different likes and dislikes.

> CHILDREN LIKE LOTS OF DIFFERENT KINDS OF THINGS. SOME CHILDREN LIKE TO PLAY QUIET GAMES. OTHER CHILDREN DON'T. SOME CHILDREN LIKE TO EAT LOTS OF VEGETABLES, WHILE OTHER CHILDREN LIKE TO EAT LOTS OF MEAT. PEOPLE LIKE DIFFERENT THINGS.
>
> TODAY I'M GOING TO ASK YOU SOME QUESTIONS ABOUT WHAT YOU LIKE AND HOW YOU FEEL ABOUT SOME THINGS AT SCHOOL. YOUR ANSWER TO A QUESTION MAY BE QUITE DIFFERENT FROM SOMEONE ELSE'S ANSWER, BUT THAT ONLY MEANS THAT THE TWO OF YOU FEEL DIFFERENTLY, AND ALL ANSWERS ARE CORRECT IF EACH CHILD IS EXPRESSING HOW HE FEELS. THE RIGHT ANSWER IS HOW YOU FEEL. THERE ARE NO WRONG ANSWERS.

LISTEN CAREFULLY TO THE QUESTIONS AS I READ THEM, THEN MAKE AN 'X' ON THE ANSWER THAT TELLS HOW YOU FEEL. PLEASE DON'T TALK. I WILL KNOW HOW YOU FEEL WHEN I SEE THE ANSWER YOU HAVE MARKED.

OPEN YOUR BOOKLETS AND LOOK THIS WAY.

(Make sure each child opens his booklet to the Sample Page entitled "These Children Are Thinking About Recess," and is looking toward you before continuing. Hold your booklet in front of you so that it is visible to each child.)

Sample Page of Pupil Booklet

THESE CHILDREN ARE THINKING ABOUT RECESS.
POINT TO THE FIRST PICTURE.

(Point to the picture on the children's left. Read the text under this picture.)

POINT TO THE MIDDLE PICTURE.
(Point to the middle picture. Read the text under this picture.)

POINT TO THE LAST PICTURE.
(Point to the last picture, read text under this picture, then read the sentence at the bottom of the page. Make sure each child understands what he is to do and makes his response before continuing.)

DO YOU UNDERSTAND WHAT YOU ARE TO DO?
(Use this page to clarify any questions the children may have.)

TURN TO PAGE ONE.

Page 1 of Pupil Booklet

POINT TO THE FIRST PICTURE. (Read text.)

POINT TO THE MIDDLE PICTURE. (Read text.)

POINT TO THE LAST PICTURE. (Read text.)
MARK THE CHILD WHO IS MORE LIKE YOU. (pause)

TURN TO PAGE TWO.

Pages 2-4 of Pupil Booklet

(Follow the same procedure as indicated for Page 1. Have the pupils point to each of the pictures as you read the corresponding text. End each page with:

MARK THE CHILD WHO IS MORE LIKE YOU. (pause)

TURN TO PAGE ... (Whichever number corresponds to the following page.)

Page 5 of Pupil Booklet

THIS TIME YOU ARE TO MARK THE FACE THAT SHOWS
HOW YOU FEEL.
(Read the text beginning with "How do you feel ...")

MARK THE FACE THAT SHOWS HOW YOU FEEL. (pause)

TURN TO PAGE 6.

Pages 6-11 of Pupil Booklet

(Follow the same procedure indicated for Page 5. Read the text beginning with "How do you feel ...," followed by:

MARK THE FACE THAT SHOWS HOW YOU FEEL. (pause)

TURN TO PAGE ... (number of the following page.)

SCHOOL
MATHEMATICS
STUDY GROUP

Grade 3
Spring

FORM 3-03

75

Name of tester _____

Date test given _____

Cedar Hall, Stanford University
Stanford, California

Form 3-03

81

82

THESE CHILDREN ARE THINKING ABOUT RECESS.

This child wants to play on the swings.

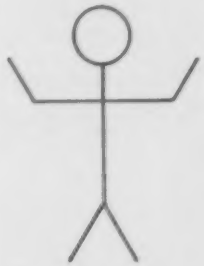
This child wants to sit under a tree.

This child wants to play ball.

WHICH CHILD IS MORE LIKE YOU?

WHICH CHILD IS MORE LIKE YOU?

This child thinks he is doing good work in arithmetic.

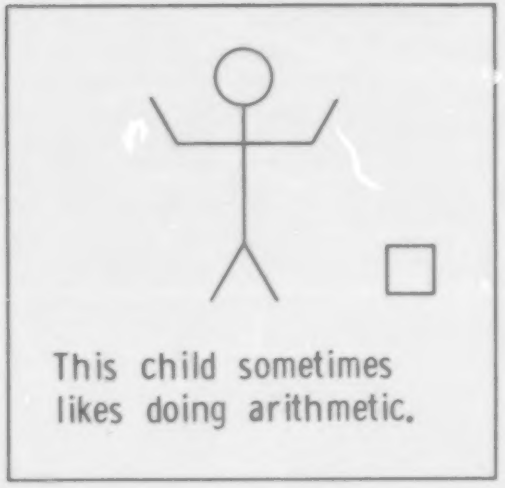


This child doesn't know how well he is doing.

This child thinks he is doing poor work in arithmetic.

WHICH CHILD IS MORE LIKE YOU ?

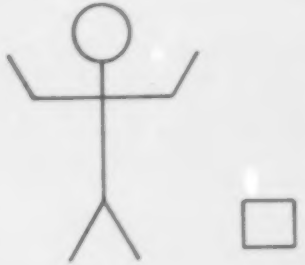
This child likes doing arithmetic.



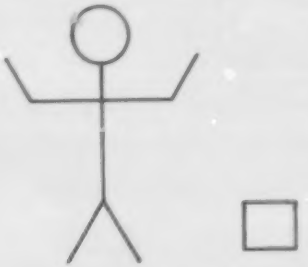
This child sometimes likes doing arithmetic.

This child doesn't like doing arithmetic.

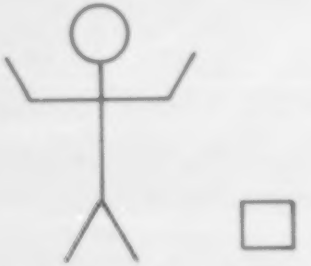
WHICH CHILD IS MORE LIKE YOU?



This child always feels upset during arithmetic class.

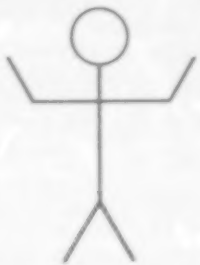


This child sometimes feels upset during arithmetic class.



This child never feels upset during arithmetic class.

WHICH CHILD IS MORE LIKE YOU?



This child usually has the right answer to arithmetic problems.

This child sometimes has the right answer and sometimes the wrong answer to arithmetic problems.

This child usually has the wrong answer to arithmetic problems.

5

WHICH FACE SHOWS HOW YOU FEEL?

How do you feel when teacher says:

"Put away your arithmetic books.
Bring out your story books."

6

WHICH FACE SHOWS HOW YOU FEEL?

How do you feel when teacher says:

"That's the end of our music lesson.
Now we will do some subtraction problems."

7

WHICH FACE SHOWS HOW YOU FEEL?

How do you feel when teacher says:

"That's all the arithmetic for today.
Now let's do our spelling."

8

WHICH FACE SHOWS HOW YOU FEEL?

How do you feel when teacher says:

"Stop working on your arithmetic problems.
It's time for reading now."

9

WHICH FACE SHOWS HOW YOU FEEL?

How do you feel when teacher says:

"It is time to do arithmetic."

10

WHICH FACE SHOWS HOW YOU FEEL?

How do you feel when teacher says:

"It is time for reading."

11

WHICH FACE SHOWS HOW YOU FEEL?

How do you feel when teacher says:

"Put away your story books.
Bring out your arithmetic books."

87

TESTER'S MANUAL - FORM 3-04

1. General Directions

The first part of Form 3-04 (Items 1-39) is an attitude inventory. Its administration is similar to that of Form 3-03; however, this Form may be more difficult in that the pupil is required to select an answer from a greater number of choices without the aid of pictorial cues.

We realize that the verbal demands of this particular scale are greater than has usually been required of pupils in this study; nevertheless, the pupils should be encouraged to work as independently as possible. For this reason, it will not be necessary to read the answer choices for every item in the scale. Items with similar format are grouped together so that reading the answer choices to the first two or three statements in a grouping may be sufficient to familiarize the pupil with the format and hence eliminate the necessity for numerous repetitions. Additionally, the tester should not define terms in either the statements or the answer choices. If the pupils have questions referring to definitions, encourage them to respond to what they "think" the words mean. Do not insist that a pupil make a response to a statement if he seems to be totally incognizant of what is being asked of him.

2. General Procedure for Administering Items 1-39

a. Identify item by number.
b. Read statement.
c. Read answer choices. (As previously indicated, some blocks of items have the same answer choice format, e.g., Items 1-13 and Items 14-29. In these cases, answer choices need only be read for the first two or three statements in each block. Once the pupils become familiar with the format they will be able to select their answers without further verbal cues. Note, however, that the answer format for Items 30-39 changes frequently enough to warrant reading both the statement and answers for each item.)
d. Instruct pupils to circle one answer choice only.
e. After last statement on each page, instruct pupils to turn to the following page which is to be identified by number.

3. Directions for Sample Pages

The first two pages of Form 3-04 contain directions and sample statements which are to be read to the pupils. The three sample statements (two at the bottom of Page 3 and one at the top of Page 4) illustrate different types of answer choices available to the pupil in the items which follow.

OPEN YOUR BOOKLETS TO PAGE 3 AND LISTEN CAREFULLY AS I READ THE DIRECTIONS.

Page 3 of Pupil Booklet

(Read instructions 1-5. As you read the sample statements at the bottom of Page 3, you may need to remind pupils of instructions 2 and 3.)

TURN TO PAGE 4.

Page 4 of Pupil Booklet

HERE IS ANOTHER SAMPLE STATEMENT. THIS TIME THERE ARE SIX ANSWERS TO CHOOSE FROM, BUT REMEMBER TO CHOOSE THE ONE THAT BEST TELLS HOW YOU FEEL.

(Read statement and answer choices.)

CIRCLE THE LETTER IN FRONT OF THE ANSWER YOU CHOOSE.

ARE THERE ANY QUESTIONS?

(Repeat any of the instructions which appropriately answer questions. Read instruction 6.)

TURN TO PAGE 5 AND LISTEN CAREFULLY.

Pages 5-14 in Pupil Booklet

Items 1-3. Identify item by number
Read statement and answer choices.
Instruct pupils how to respond, e.g., CIRCLE THE LETTER ...

Items 4-13. Identify item by number.
Read statement.
CIRCLE YOUR ANSWER.

Items 14-16. Identify item by number.
Read statement and answer choices.
CIRCLE YOUR ANSWER.

Items 17-29. Identify item by number.
Read statement.
CIRCLE YOUR ANSWER.

Items 30-39. Identify each item by number.
Read statement and answer choices.
CIRCLE YOUR ANSWER.

DO NOT TURN TO THE NEXT PAGE JUST YET.

LEAVE YOUR BOOKLETS AS THEY ARE, AND LET'S TAKE SOME TIME TO STRETCH BEFORE GOING ON.

(Allow the children two or three minutes to move about, but do not let them run around the room.)

ALL RIGHT, NOW LET'S GO BACK TO SOMETHING DIFFERENT IN THE BOOKLETS. LEAVE YOUR BOOKLETS AS THEY ARE -- DO NOT TURN THE PAGE.

(Get the attention of all pupils before continuing. Hold the page of symbols (+, -, ×, ÷, $\sqrt{\ }$) so that is is visible to all children.)

YOU ARE GOING TO WORK THE REST OF THE PROBLEMS BY YOURSELVES. (Point to each of the signs, "+, -, ×, ÷, $\sqrt{\ }$ ", while saying ...)

WATCH FOR THESE SIGNS; THEY TELL YOU WHAT TO DO TO FIND THE MISSING NUMBER IN EACH EXAMPLE. IF YOU NEED THINGS TO COUNT, USE YOUR FINGERS OR MAKE MARKS ON THE PAGE.

YOU MAY NOT HAVE BEEN TAUGHT HOW TO WORK SOME EXAMPLES. IF YOU COME TO AN EXAMPLE YOU DON'T KNOW HOW TO DO, GO ON TO THE NEXT ONE. WORK ALL THE EXAMPLES YOU KNOW HOW TO DO. WHEN YOU FINISH ONE PAGE, TURN TO THE NEXT. ARE THERE ANY QUESTIONS?

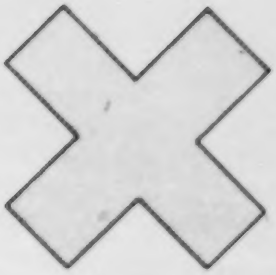
(If there are questions, repeat any of the above instructions appropriate to the questions.)

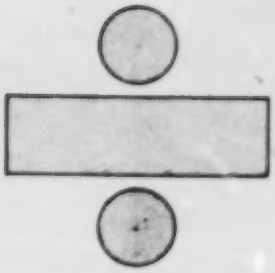
REMEMBER, (point to symbols again) WATCH FOR THESE SIGNS, AND WORK ALL THE EXAMPLES YOU KNOW HOW TO DO. NOW, TURN TO PAGE 16 IN YOUR BOOKLET AND BEGIN. (Page 16 follows a blank page in the test booklet. Make sure each pupil begins work on Page 16.)

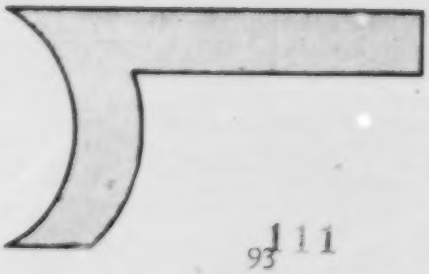
Pages 16-18 of Pupil Booklet

You are to circulate among the children as they work the computation examples. If any questions arise, you may repeat any of the above instructions. No further hints are to be given. Remind the pupils to continue working until they have completed the booklets, pointing out that there are three pages of problems.

In order to keep the children who may finish early from disturbing those who are still working, we have provided you with some activity pages. You should carry them with you as you circulate among the children. When a child has finished his answer booklet, and you have checked to see that he has completed all three pages, remove his booklet and give him the activity pages. These activities, hopefully, will keep the faster children occupied while slower workers complete their booklets. The children may keep these pages. Slower children should be given a set of activity pages to take with them after they have completed their booklets.







SCHOOL
MATHEMATICS
STUDY GROUP

FORM 3-04

Name of Tester _____

Date Test Given _____

Cedar Hall
Stanford University
Stanford, California

DIRECTIONS

1. This is not a test. There are no "right" or "wrong" answers to any of the questions. Just answer them as honestly as you can.

2. The questions ask you to tell how you feel about many different things. Your answer to each question should tell how you feel about it.

3. To answer a question, circle the letter in front of the answer which seems best to you.

4. Please work carefully but quickly. Do not spend a long time on any one question. Just circle the answer that seems best to you at the moment. Please answer all the items, and give only one answer to each.

5. Here are three sample questions for you to do. Circle the letter in front of the answer which tells best how you feel about the statement.

   It is more fun to play outdoors in winter than in summer.

   (A) strongly agree
   (B) agree
   (C) don't know
   (D) disagree
   (E) strongly disagree

   I like to fix my own snacks when I am hungry.

   (A) always
   (B) usually
   (C) sometimes
   (D) hardly ever
   (E) never

During recess, I like to go to the library and read.

(A) strongly agree
(B) agree
(C) mildly agree
(D) mildly disagree
(E) disagree
(F) strongly disagree

6. If you have any questions while you are working, please raise your hand.

(1) The subject I enjoy least is arithmetic.

(A) strongly agree
(B) agree
(C) don't know
(D) disagree
(E) strongly disagree

(2) I cannot understand how some students think arithmetic is fun.

(A) strongly agree
(B) agree
(C) don't know
(D) disagree
(E) strongly disagree

(3) Arithmetic is boring.

(A) strongly agree
(B) agree
(C) don't know
(D) disagree
(E) strongly disagree

(4) Arithmetic is fun.

(A) strongly agree
(B) agree
(C) don't know
(D) disagree
(E) strongly disagree

(5) No matter how hard I try, I cannot understand arithmetic.

(A) strongly agree
(B) agree
(C) don't know
(D) disagree
(E) strongly disagree

(6) Arithmetic is a subject which is more difficult to understand than any other subject.

(A) strongly agree
(B) agree
(C) don't know
(D) disagree
(E) strongly disagree

(7) There is so much hard work in arithmetic that it takes the fun out of it.

(A) strongly agree
(B) agree
(C) don't know
(D) disagree
(E) strongly disagree

(8) I would like arithmetic better if it were not made so hard in class.

(A) strongly agree
(B) agree
(C) don't know
(D) disagree
(E) strongly disagree

(9) Arithmetic is easier for me than other subjects.

(A) strongly agree
(B) agree
(C) don't know
(D) disagree
(E) strongly disagree

(10) Arithmetic is so hard to understand that I do not like it as well as other subjects.

(A) strongly agree
(B) agree
(C) don't know
(D) disagree
(E) strongly disagree

(11) To do well in arithmetic, you have to be smarter than you have to be to do well in reading.

(A) strongly agree
(B) agree
(C) don't know
(D) disagree
(E) strongly disagree

(12) Most students work very hard to do well in arithmetic.

(A) strongly agree
(B) agree
(C) don't know
(D) disagree
(E) strongly disagree

(13) Arithmetic is more of a game than it is hard work.

(A) strongly agree
(B) agree
(C) don't know
(D) disagree
(E) strongly disagree

(14) I wish it were easier for me to talk in front of my arithmetic class.

(A) strongly agree
(B) agree
(C) mildly agree
(D) mildly disagree
(E) disagree
(F) strongly disagree

(15) I wish I were more proud of my arithmetic homework.

(A) strongly agree
(B) agree
(C) mildly agree
(D) mildly disagree
(E) disagree
(F) strongly disagree

(16) I wish I were trying harder in arithmetic.

(A) strongly agree
(B) agree
(C) mildly agree
(D) mildly disagree
(E) disagree
(F) strongly disagree

(17) I would like to be called on in arithmetic class more often.

(A) strongly agree
(B) agree
(C) mildly agree
(D) mildly disagree
(E) disagree
(F) strongly disagree

(18) I wish I could do better in arithmetic.

(A) strongly agree
(B) agree
(C) mildly agree
(D) mildly disagree
(E) disagree
(F) strongly disagree

(19) I wish I felt less upset in arithmetic class.

(A) strongly agree
(B) agree
(C) mildly agree
(D) mildly disagree
(E) disagree
(F) strongly disagree

(20) I wish my arithmetic teacher did not make me feel that I am doing poorly.

(A) strongly agree
(B) agree
(C) mildly agree
(D) mildly disagree
(E) disagree
(F) strongly disagree

(21) I wish I were not so discouraged with my arithmetic school work.

(A) strongly agree
(B) agree
(C) mildly agree
(D) mildly disagree
(E) disagree
(F) strongly disagree

(22) I find it hard to talk in front of my arithmetic class.

(A) strongly agree
(B) agree
(C) mildly agree
(D) mildly disagree
(E) disagree
(F) strongly disagree

(23) I am very proud of my arithmetic school work.

(A) strongly agree
(B) agree
(C) mildly agree
(D) mildly disagree
(E) disagree
(F) strongly disagree

(24) I try to do the very best work in arithmetic that I can.

(A) strongly agree
(B) agree
(C) mildly agree
(D) mildly disagree
(E) disagree
(F) strongly disagree

(25) I like to be called on in arithmetic class.

(A) strongly agree
(B) agree
(C) mildly agree
(D) mildly disagree
(E) disagree
(F) strongly disagree

(26) I think I am not doing very well in arithmetic class.

(A) strongly agree
(B) agree
(C) mildly agree
(D) mildly disagree
(E) disagree
(F) strongly disagree

(27) I feel upset in arithmetic class.

(A) strongly agree
(B) agree
(C) mildly agree
(D) mildly disagree
(E) disagree
(F) strongly disagree

(28) My math teacher makes me feel that I am doing poorly.

(A) strongly agree
(B) agree
(C) mildly agree
(D) mildly disagree
(E) disagree
(F) strongly disagree

(29) I am discouraged with my arithmetic school work.

(A) strongly agree
(B) agree
(C) mildly agree
(D) mildly disagree
(E) disagree
(F) strongly disagree

(30) Nervousness while taking an arithmetic test keeps me from doing well.

(A) always
(B) often
(C) sometimes
(D) rarely
(E) never

(31) When I have been doing poorly in arithmetic, my fear of a bad grade keeps me from doing my best.

(A) never
(B) hardly ever
(C) sometimes
(D) usually
(E) always

(32) When I am poorly prepared for an arithmetic test, I get upset and do even less well than I expected.

(A) never
(B) hardly ever
(C) sometimes
(D) usually
(E) always

(33) The more important the arithmetic test, the less well I seem to do.

(A) always
(B) usually
(C) sometimes
(D) hardly ever
(E) never

(34) During arithmetic tests I find I cannot answer questions even though I usually know the answers and might remember them when the test is over.

(A) always
(B) often
(C) sometimes
(D) hardly ever
(E) never

(35) I find that my mind goes blank at the beginning of an arithmetic test and it takes me a few minutes before I can answer the questions.

(A) I almost always blank out at first
(B) I usually blank out at first
(C) I sometimes blank out at first
(D) I hardly ever blank out at first
(E) I never blank out at first

(36) I get so tired from worrying about an arithmetic test that I find I almost don't care how well I do by the time I start it.

(A) I never feel this way
(B) I hardly ever feel this way
(C) I sometimes feel this way
(D) I often feel this way
(E) I almost always feel this way

(37) Because I worry so much about not being able to finish arithmetic tests in the required time, I always do worse than the rest of the class.

(A) always
(B) usually
(C) sometimes
(D) seldom
(E) never

(38) I find myself reading arithmetic test questions without understanding them, and I must go back over them so they will make sense.

(A) never
(B) rarely
(C) sometimes
(D) often
(E) almost always

(39) When I don't do well on difficult questions at the beginning of an arithmetic test, it tends to upset me so that I don't do well even on the easy questions later on.

(A) never
(B) rarely
(C) sometimes
(D) usually
(E) always

Write the answer to each of these.

Do your work on this sheet.

(40) $13 - 8 =$ _____

(41) $7 \times 4 =$ _____

(42) $9 + 5 + 8 =$ _____

(43) $24 \div 6 =$ _____

(44)

$$\begin{array}{r} 103 \\ +\ \ 7 \\ \hline \end{array}$$

(45)

$$\begin{array}{r} 96 \\ +\ 85 \\ \hline \end{array}$$

(46)

$$\begin{array}{r} 378 \\ 63 \\ +\ 504 \\ \hline \end{array}$$

(47)

$$\begin{array}{r} 56 \\ \times\ \ 3 \\ \hline \end{array}$$

(48)

$$\begin{array}{r} 32 \\ \times\ 12 \\ \hline \end{array}$$

(49)

$$\begin{array}{r} 72 \\ -\ 65 \\ \hline \end{array}$$

(50)

$$\begin{array}{r} 834 \\ -\ 49 \\ \hline \end{array}$$

(51)

$$\begin{array}{r} 600 \\ -\ 123 \\ \hline \end{array}$$

(52)

$2\overline{)412}$

(53)

$\frac{1}{4} + \frac{2}{4} =$ _____

(54)

$1 - \frac{1}{3} =$ _____

Here are some number sentences. In each blank, write the answer which makes each sentence true.

(55) $246 + 135 = 135 + _____$

(56) $_____ + 0 = 79$

(57) $3 \times _____ = 8 \times 3$

(58) $_____ \times 25 = 0$

(59) $(72 + 34) + 56 = 72 + (_____ + 56)$

(60) $10 \times _____ = 10$

(61) $(83 + 27) - _____ = 83$

(62) $4 \times 12 = (4 \times _____) + (4 \times 2)$

DESCRIPTION AND STATISTICAL PROPERTIES

OF SCALES - FALL

SCORING THE GRADE 3 FALL SCALES

For all the scales in the fall testing, the items were scored as follows:

correct response

incorrect or
multiple response

non-attempt.

The actual scale score used in calculating the statistics in this report is the sum of correct responses for all items within the scale.

601 PLACE VALUE (8 items; 1/4 of population)

This scale is designed to measure the pupil's ability to interpret the meaning of symbols in the numeration system. The items are basically of two types: identification of a digit in reference to its location or identification of a numeral in terms of its description. There are two exceptions to this general format. One case requires the interpretation of a numeral in terms of a pictorial display, while the other requires completion of expanded notation. This scale consists of four multiple choice items and four items requiring constructed responses. It is the same as 504 and 702 and is an extension of 605.

The items which make up this scale come from Form 3-01 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 1 - 8 Pages 24 - 26

SCALE STATISTICS:

NUMBER OF CASES	=	195
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	3.774
STANDARD DEVIATION	=	2.124
CRONBACH'S ALPHA	=	0.729
ERROR OF MEASUREMENT	=	1.105

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	R.S. BIS	PERCENT NT
1	0.441	0.446	0.433	1.026
2	0.656	0.677	0.762	3.077
3	0.785	0.797	0.453	1.538
4	0.544	0.561	0.723	3.077
5	0.615	0.619	0.459	0.513
6	0.195	0.244	0.663	20.000
7	0.415	0.420	0.663	1.026
8	0.123	0.124	0.263	1.026

602 APPLICATION (8 items; 1/4 of population)

This scale is composed of eight story problems which are designed to measure the pupil's ability to select and perform the relevant arithmetic operations. Seven of the items involve either addition or subtraction or both, while the eighth deals with partitioning a set into two equivalent groups. The format for all the items in this scale is multiple choice. It is the same as 506 and is an extension of 606, 611, and 612.

The items which make up this scale come from Form 3-01 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 9 - 16 Pages 27 - 29

SCALE STATISTICS:

NUMBER OF CASES	=	195
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	5.308
STANDARD DEVIATION	=	1.870
CRONBACH'S ALPHA	=	0.598
ERROR OF MEASUREMENT	=	1.185

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
9	0.744	0.747	0.585	0.513
10	0.682	0.700	0.617	2.564
11	0.744	0.763	0.574	2.564
12	0.677	0.684	0.381	1.026
13	0.826	0.826	0.508	0.0
14	0.697	0.731	0.265	4.615
15	0.426	0.444	0.446	4.103
16	0.513	0.546	-0.046	6.154

603 NUMBER COMPARISON - ORDER (8 items; 1/4 of population)

The items in this scale are designed to assess the pupil's understanding of numerical order in terms of both cardinality and ordinality. The pupil is required to identify objects as well as construct responses to indicate his knowledge of certain basic notions of order, including the concepts "fewer than," "between," "least," "before," "middle," and "last." It is the same as 503 and is an extension of 607, 609, and 610.

The items which make up this scale come from Form 3-01 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 17-24 Pages 30 - 32

SCALE STATISTICS:

NUMBER OF CASES	=	195
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	5.305
STANDARD DEVIATION	=	2.002
CRONBACH'S ALPHA	=	0.601
ERROR OF MEASUREMENT	=	1.012

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	M.S. BIS	PERCENT NT
17	0.851	0.850	0.598	0.513
18	0.831	0.844	0.289	1.538
19	0.821	0.847	0.499	3.077
20	0.933	0.953	0.532	0.0
21	0.282	0.286	0.298	1.538
22	0.713	0.747	0.555	4.615
23	0.487	0.484	0.471	3.590
24	0.908	0.917	0.395	1.026

604 COMPUTATION - SUBTRACTION (8 items; 1/4 of population)

This scale consists of items which range from inverses of basic 1-digit addition combinations requiring either simple recall or manipulation of small sets, to items involving the subtraction of 2-digit numbers which require knowledge of an algorithm with regrouping. Items are presented in both sentence and vertical format, and each of the eight items requires a constructed response. This scale is the same as 511 and is an extension of 608, 613, and 614.

The items which make up this scale come from Form 3-01 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 25-32 Pages 33,34

SCALE STATISTICS:

NUMBER OF CASES	=	195
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	4.041
STANDARD DEVIATION	=	1.780
CRONBACH'S ALPHA	=	0.662
ERROR OF MEASUREMENT	=	1.034

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	R.S. BIS	PERCENT NT
25	0.807	0.807	0.533	0.0
26	0.533	0.627	0.427	14.872
27	0.482	0.635	0.542	24.103
28	0.610	0.672	0.637	9.251
29	0.790	0.856	0.695	7.692
30	0.041	0.067	0.404	38.974
31	0.067	0.117	0.354	43.077
32	0.621	0.703	0.473	11.795

605 PLACE VALUE S (4 items; 1/4 of population)

This scale includes selected items from scale 601. These items are 1 through 4. It is the same as 331, 407, 514, and 710.

SCALE STATISTICS:

NUMBER OF CASES	=	195
NUMBER OF ITEMS	=	4
MEAN TOTAL SCORE	=	2.426
STANDARD DEVIATION	=	1.324
CRONBACH'S ALPHA	=	0.657
ERROR OF MEASUREMENT	=	0.776

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
1	0.441	0.446	0.401	1.026
2	0.656	0.677	0.755	3.077
3	0.785	0.797	0.447	1.538
4	0.544	0.561	0.691	3.077

606 APPLICATION S-1 (4 items; 1/4 of population)

This scale includes selected items from scale 602. These items are 9 through 12. It is the same as 333, 408, and 516.

SCALE STATISTICS:

NUMBER OF CASES	=	195
NUMBER OF ITEMS	=	4
MEAN TOTAL SCORE	=	2.846
STANDARD DEVIATION	=	1.263
CRONBACH'S ALPHA	=	0.656
ERROR OF MEASUREMENT	=	0.744

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
9	0.746	0.747	0.637	0.513
10	0.682	0.700	0.638	2.564
11	0.744	0.763	0.600	2.564
12	0.677	0.684	0.455	1.026

607 NUMBER COMPARISON - ORDER S-1 (3 items; 1/4 of population)

This scale includes selected items from scale 603. These items are 17 through 19. It is the same as 330, 406, and 513.

SCALE STATISTICS:

NUMBER OF CASES	=	195
NUMBER OF ITEMS	=	3
MEAN TOTAL SCORE	=	2.508
STANDARD DEVIATION	=	0.740
CRONBACH'S ALPHA	=	0.374
ERROR OF MEASUREMENT	=	0.586

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
17	0.851	0.850	0.488	0.513
18	0.836	0.849	0.119	1.538
19	0.821	0.847	0.404	3.077

608 COMPUTATION - SUBTRACTION S-1 (6 items; 1/4 of population)

This scale includes selected items from scale 604. These items are 25 through 29 and 32. It is the same as 336 and 519.

SCALE STATISTICS:

NUMBER OF CASES	=	135
NUMBER OF ITEMS	=	6
MEAN TOTAL SCORE	=	3.933
STANDARD DEVIATION	=	1.610
CRONBACH'S ALPHA	=	0.671
ERROR OF MEASUREMENT	=	0.958

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
25	0.897	0.897	0.551	0.0
26	0.533	0.627	0.406	14.872
27	0.482	0.635	0.531	24.103
28	0.610	0.672	0.628	9.231
29	0.790	0.856	0.708	7.692
32	0.621	0.703	0.473	11.795

609 NUMBER COMPARISON - ORDER S-2 (2 items; 1/4 of population)

This scale includes selected items from scale 603. These items are 18 and 19. It is the same as 337, 410, 526, and 711.

SCALE STATISTICS:

NUMBER OF CASES	=	195
NUMBER OF ITEMS	=	2
MEAN TOTAL SCORE	=	1.656
STANDARD DEVIATION	=	0.545
CRONBACH'S ALPHA	=	0.087
ERROR OF MEASUREMENT	=	0.521

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
18	0.836	0.845	0.068	1.026
19	0.821	0.847	0.066	3.077

610 NUMBER COMPARISONS - ORDER S-3 (5 items; 1/4 of population)

This scale includes selected items from scale 603. These items are 18, 19, and 21 through 23. It is the same as 527 and 712.

SCALE STATISTICS:

NUMBER OF CASES	=	195
NUMBER OF ITEMS	=	5
MEAN TOTAL SCORE	=	3.118
STANDARD DEVIATION	=	1.241
CRONBACH'S ALPHA	=	0.487
ERROR OF MEASUREMENT	=	0.889

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
18	0.836	0.845	0.259	1.026
19	0.821	0.847	0.407	3.077
21	0.282	0.286	0.301	1.538
22	0.713	0.747	0.440	4.615
23	0.467	0.484	0.386	3.590

611 APPLICATION S-2 (3 items; 1/4 of population)

This scale includes selected items from scale 602. These items are 9, 11, and 12. It is the same as 338, 411, 528, and 714.

SCALE STATISTICS:

NUMBER OF CASES	=	195
NUMBER OF ITEMS	=	3
MEAN TOTAL SCORE	=	2.164
STANDARD DEVIATION	=	0.973
CRONBACH'S ALPHA	=	0.550
ERROR OF MEASUREMENT	=	0.653

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
9	0.744	0.747	0.564	0.513
11	0.744	0.763	0.508	2.564
12	0.677	0.684	0.388	1.026

612 APPLICATION S-3 (6 items; 1/4 of population)

This scale includes selected items from scale 602. These items are 9, 11, 12, and 14 through 16. It is the same as 529 and 715.

SCALE STATISTICS:

NUMBER OF CASES	=	195
NUMBER OF ITEMS	=	6
MEAN TOTAL SCORE	=	3.800
STANDARD DEVIATION	=	1.445
CRONBACH'S ALPHA	=	0.450
ERROR OF MEASUREMENT	=	1.072

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
9	0.744	0.747	0.490	0.513
11	0.744	0.763	0.452	2.564
12	0.677	0.684	0.266	1.026
14	0.697	0.731	0.240	4.615
15	0.426	0.444	0.411	4.103
16	0.513	0.546	-0.016	6.154

613 COMPUTATION - SUBTRACTION S-2 (4 items; 1/4 of population)

This scale includes selected items from scale 604. These items are 25, 26, 28, and 32. It is the same as 340, 532, and 719.

SCALE STATISTICS:

NUMBER OF CASES	=	195
NUMBER OF ITEMS	=	4
MEAN TOTAL SCORE	=	2.662
STANDARD DEVIATION	=	1.145
CRONBACH'S ALPHA	=	0.505
ERROR OF MEASUREMENT	=	0.805

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
25	0.897	0.897	0.455	0.0
26	0.533	0.627	0.305	14.872
28	0.610	0.672	0.532	9.231
32	0.621	0.703	0.373	11.795

614 COMPUTATION - SUBTRACTION S-3 (6 items; 1/4 of population)

This scale includes selected items from scale 604. These items are 25, 26, 28, and 30 through 32. It is the same as 533 and 720.

SCALE STATISTICS:

NUMBER OF CASES	=	195
NUMBER OF ITEMS	=	6
MEAN TOTAL SCORE	=	2.769
STANDARD DEVIATION	=	1.262
CRONBACH'S ALPHA	=	0.510
ERROR OF MEASUREMENT	=	0.883

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
25	0.897	0.897	0.435	0.0
26	0.533	0.627	0.344	14.872
28	0.610	0.672	0.552	9.231
30	0.041	0.067	0.393	38.974
31	0.067	0.117	0.327	43.077
32	0.621	0.703	0.380	11.795

DESCRIPTION AND STATISTICAL PROPERTIES

OF SCALES - SPRING

SCORING THE GRADE 3 SPRING SCALES

For all achievement scales in the spring testing (701-721, 727, and 728) the items were scored as follows:

correct response

incorrect response
or multiple response

non-attempt.

The actual scale score used in calculating the statistics in this report is the sum of correct responses for all items within the scale.

For the attitude scales in the spring testing (722-726 and 729-733) the response for each item was assigned a value which ranged from 1 for the most negative response to 5 or 6 (depending on the number of response choices) for the most positive response. Eligible values for items with only three response choices were 1, 3, and 5.

The scale score used in calculating the statistics in this report is the sum of the values for all items withing the scale. If a student failed to respond to any item in an attitude scale, he did not receive a scale score.

701 NUMBER COMPARISON - ORDER (8 items)

The items in this scale are designed to assess the pupil's understanding of numerical order in terms of both cardinality and ordinality. The pupil is required to identify objects as well as construct responses to indicate his knowledge of certain basic notions of order, including the concepts "between," "least," "middle," and "next to last." It is an extension of 711 and 712.

The items which make up this scale come from Form 3-02 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 1 - 8 Pages 53, 54

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	4.794
STANDARD DEVIATION	=	1.807
CRONBACH'S ALPHA	=	0.554
ERROR OF MEASUREMENT	=	1.206

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	R.S. BIS	PERCENT NT
1	0.789	0.801	0.301	1.560
2	0.787	0.803	0.359	1.986
3	0.308	0.314	0.186	1.986
4	0.797	0.822	0.536	2.979
5	0.521	0.538	0.449	3.262
6	0.431	0.444	0.304	2.837
7	0.650	0.679	0.446	4.255
8	0.512	0.540	0.266	5.248

702 PLACE VALUE (8 items)

This scale is designed to measure the pupil's ability to interpret the meaning of symbols in the numeration system. The items are basically of two types: identification of a digit in reference to its location or identification of a numeral in terms of its description. There are two exceptions to this general format. One case requires the interpretation of a numeral in terms of a pictorial display, while the other requires completion of expanded notation. This scale consists of four multiple choice items and four items requiring constructed responses. It is the same as 504 and 601, and is an extension of 710.

The items which make up this scale come from Form 3-02 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 9 - 16 Pages 55, 56

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	4.126
STANDARD DEVIATION	=	2.242
CRONBACH'S ALPHA	=	0.758
ERROR OF MEASUREMENT	=	1.102

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
9	0.357	0.364	0.510	1.844
10	0.628	0.667	0.616	5.816
11	0.698	0.714	0.566	2.270
12	0.634	0.661	0.728	4.113
13	0.752	0.757	0.524	0.709
14	0.450	0.502	0.671	10.355
15	0.492	0.497	0.651	0.993
16	0.115	0.116	0.503	1.277

703 NUMBER LINE (7 items)

This scale is designed to test the pupil's ability to interpret a numerical system in terms of a geometric concept. Five of the items, each requiring constructed responses, deal with numerical order and the notion of correspondence, while the remaining two items require an interpretation of addition or subtraction in terms of actions performed on the number line. It is the same as 505, and is an extension of 713.

The items which make up this scale come from Form 3-02 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 17 - 23 Pages 57, 58

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	7
MEAN TOTAL SCORE	=	3.745
STANDARD DEVIATION	=	1.293
CRONBACH'S ALPHA	=	0.454
ERROR OF MEASUREMENT	=	0.955

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	R.S. BIS	PERCENT NT
17	0.959	0.963	0.425	0.426
18	0.943	0.946	0.344	0.284
19	0.624	0.635	0.206	1.702
20	0.047	0.054	0.314	12.766
21	0.513	0.558	0.316	7.943
22	0.183	0.187	0.639	1.986
23	0.475	0.502	0.256	5.390

704 APPLICATION (8 items)

This scale is composed of eight story problems which are designed to measure the pupil's ability to select and perform the relevant arithmetic operations. Six of the items involve either addition or subtraction or both; one of the items involves addition and multiplication, and one deals with partitioning a set into two equivalent groups. The format for all the items in this scale is multiple choice. It is an extension of 714 and 715.

The items which make up this scale come from Form 3-02 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 24 -31 Pages 59, 60

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	4.980
STANDARD DEVIATION	=	2.054
CRONBACH'S ALPHA	=	0.669
ERROR OF MEASUREMENT	=	1.181

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
24	0.755	0.773	0.503	2.411
25	0.769	0.782	0.659	1.702
26	0.621	0.637	0.474	2.411
27	0.813	0.845	0.447	3.830
28	0.529	0.565	0.526	6.383
29	0.538	0.571	0.206	5.816
30	0.471	0.501	0.511	5.957
31	0.485	0.503	0.496	3.546

705 RATIONALS (8 items)

The items in this scale are designed to measure the pupil's rudimentary concepts of rational numbers. In general, pupils are required to associate a fraction with its corresponding pictorial representation. Only one of the items requires a constructed response; the others are in multiple choice format. It is the same as 507 and is an extension of 716.

The items which make up this scale come from Form 3-02 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 32 - 39 Pages 61, 62

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	4.085
STANDARD DEVIATION	=	1.780
CRONBACH'S ALPHA	=	0.548
ERROR OF MEASUREMENT	=	1.197

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
32	0.901	0.912	0.320	1.277
33	0.312	0.319	0.416	2.128
34	0.411	0.418	0.350	1.702
35	0.546	0.562	0.171	2.837
36	0.515	0.522	0.446	1.277
37	0.211	0.218	0.389	2.979
38	0.447	0.471	0.400	5.106
39	0.742	0.758	0.311	2.128

706 STRUCTURE OF SPACE (8 items)

This is a geometry scale designed primarily to ascertain whether pupils have command of certain fundamental concepts of Euclidean geometry. Six of the items are concerned with the concepts of point, line, and plane or their relationships; one item involves the identification of a solid figure; and one item, the topological notion of "outside". All items are multiple choice, and with the exception of one, each has an accompanying figure.

The items which make up this scale come from Form 3-02 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 40 - 47 Pages 63 - 65

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	4.298
STANDARD DEVIATION	=	1.703
CRONBACH'S ALPHA	=	0.459
ERROR OF MEASUREMENT	=	1.253

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
40	0.766	0.787	0.286	2.695
41	0.389	0.410	0.237	5.106
42	0.559	0.585	0.263	4.397
43	0.763	0.801	0.410	4.681
44	0.652	0.674	0.153	3.262
45	0.260	0.276	0.219	5.957
46	0.559	0.572	0.319	2.270
47	0.350	0.372	0.250	5.816

707 COMPUTATION - ADDITION (8 items)

This scale is designed to assess the pupil's primary knowledge of addition facts and the addition algorithm. The items range from basic 1-digit combinations, requiring only simple recall or counting, to the addition of two 4-digit numbers, requiring regrouping. Items are presented in both sentence and vertical formats, and each item requires a constructed response. It is an extension of 717 and 718.

The items which make up this scale come from Form 3-02 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 48 - 55 Page 66

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	5.379
STANDARD DEVIATION	=	2.384
CRONBACH'S ALPHA	=	0.815
ERROR OF MEASUREMENT	=	1.025

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
48	0.908	0.925	0.572	1.844
49	0.799	0.867	0.776	7.943
50	0.677	0.705	0.768	3.972
51	0.740	0.791	0.642	6.383
52	0.610	0.708	0.608	13.901
53	0.597	0.649	0.818	7.943
54	0.489	0.537	0.694	8.936
55	0.559	0.631	0.797	11.489

708 COMPUTATION - SUBTRACTION (8 items)

This scale parallels scale 707. It consists of items which range from inverses of basic 1-digit addition combinations requiring either simple recall or manipulation of small sets, to items involving the subtraction of 3-digit numbers which require knowledge of an algorithm with regrouping. Items are presented in both sentence and vertical format, and each of the eight items requires a constructed response. It is an extension of 719.

The items which make up this scale come from Form 3-02 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 56 - 63 Page 67

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	4.279
STANDARD DEVIATION	=	2.347
CRONBACH'S ALPHA	=	0.813
ERROR OF MEASUREMENT	=	1.014

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
56	0.854	0.880	0.537	2.979
57	0.681	0.775	0.619	12.199
58	0.740	0.804	0.720	7.943
59	0.330	0.401	0.773	17.589
60	0.374	0.423	0.785	11.489
61	0.730	0.811	0.733	9.929
62	0.339	0.387	0.790	12.482
63	0.230	0.277	0.689	17.163

709 COMPUTATION - MULTIPLICATION (8 items)

This scale is designed to assess the pupil's knowledge of multiplication facts. Five of the items are basic 1-digit combinations, while the remaining three items require the multiplication of a 1-digit number and a 2-digit number with no regrouping. With the exception of one example, all items are presented in sentence format. It is the same as 512 and is an extension of 721.

The items which make up this scale come from Form 3-02 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 64 - 71 Page 68

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	4.658
STANDARD DEVIATION	=	2.653
CRONBACH'S ALPHA	=	0.864
ERROR OF MEASUREMENT	=	0.977

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
64	0.811	0.881	0.926	7.943
65	0.699	0.798	0.927	12.340
66	0.730	0.840	0.948	13.050
67	0.289	0.397	0.615	27.092
68	0.628	0.746	0.903	15.745
69	0.529	0.692	0.841	23.546
70	0.357	0.462	0.676	22.695
71	0.613	0.690	0.661	11.206

710 PLACE VALUE S (4 items)

This scale includes selected items from scale 702. These items are 9 through 12. It is the same as 331, 407, 514, and 605.

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	4
MEAN TOTAL SCORE	=	2.318
STANDARD DEVIATION	=	1.344
CRONBACH'S ALPHA	=	0.664
ERROR OF MEASUREMENT	=	0.779

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
9	0.357	0.364	0.454	1.844
10	0.628	0.667	0.649	5.816
11	0.698	0.714	0.516	2.270
12	0.634	0.661	0.683	4.113

711 NUMBER COMPARISON - ORDER S-1 (2 items)

This scale includes selected items from scale 701. These items are 1 and 2. It is the same as 337, 410, 526, and 609.

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	2
MEAN TOTAL SCORE	=	1.576
STANDARD DEVIATION	=	0.603
CRONBACH'S ALPHA	=	0.161
ERROR OF MEASUREMENT	=	0.552

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
1	0.789	0.801	0.123	1.560
2	0.787	0.803	0.123	1.986

712 NUMBER COMPARISON - ORDER S-2 (5 items)

This scale includes selected items from scale 701. These items are 1 through 5. It is the same as 527 and 610.

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	5
MEAN TOTAL SCORE	=	3.201
STANDARD DEVIATION	=	1.204
CRONBACH'S ALPHA	=	0.423
ERROR OF MEASUREMENT	=	0.914

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
1	0.789	0.801	0.252	1.560
2	0.787	0.803	0.340	1.986
3	0.308	0.314	0.133	1.986
4	0.797	0.822	0.400	2.979
5	0.521	0.538	0.381	3.262

713 NUMBER LINE S (3 items)

This scale includes selected items from scale 703. These items are 17 through 19. It is the same as 332 and 515.

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	3
MEAN TOTAL SCORE	=	2.526
STANDARD DEVIATION	=	0.684
CRONBACH'S ALPHA	=	0.450
ERROR OF MEASUREMENT	=	0.507

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
17	0.959	0.964	0.869	0.567
18	0.943	0.947	0.784	0.426
19	0.624	0.636	0.318	1.844

714 APPLICATION S-1 (3 items)

This scale includes selected items from scale 704. These items are 24 through 26. It is the same as 338, 411, 528, and 611.

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	3
MEAN TOTAL SCORE	=	2.145
STANDARD DEVIATION	=	0.971
CRONBACH'S ALPHA	=	0.549
ERROR OF MEASUREMENT	=	0.652

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
24	0.755	0.773	0.439	2.411
25	0.769	0.782	0.630	1.702
26	0.621	0.637	0.402	2.411

715 APPLICATION S-2 (6 items)

This scale includes selected items from scale 704. These items are 24 through 29. It is the same as 529 and 612.

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	6
MEAN TOTAL SCORE	=	4.024
STANDARD DEVIATION	=	1.559
CRONBACH'S ALPHA	=	0.583
ERROR OF MEASUREMENT	=	1.006

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
24	0.755	0.773	0.463	2.411
25	0.769	0.782	0.634	1.702
26	0.621	0.637	0.422	2.411
27	0.813	0.845	0.463	3.830
28	0.529	0.565	0.448	6.383
29	0.538	0.571	0.195	5.816

716 RATIONALS S (7 items)

This scale includes selected items from scale 705. These items are 32 through 38. It is the same as 334 and 517.

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	7
MEAN TOTAL SCORE	=	3.343
STANDARD DEVIATION	=	1.628
CRONBACH'S ALPHA	=	0.525
ERROR OF MEASUREMENT	=	1.122

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
32	0.901	0.912	0.277	1.277
33	0.312	0.319	0.443	2.128
34	0.411	0.418	0.354	1.702
35	0.546	0.562	0.149	2.837
36	0.515	0.522	0.446	1.277
37	0.211	0.218	0.381	2.979
38	0.447	0.471	0.367	5.106

717 COMPUTATION - ADDITION S-1 (1 item)

This scale consists of item 48 from scale 707. It is the same as 339, 412, and 530.

RESPONSE	PERCENT	SAMPLE SIZE
correct	90.8	705
incorrect	7.4	
no attempt	1.8	

718 COMPUTATION - ADDITION S-2 (5 items)

This scale includes selected items from scale 707. These items are 48 through 52. It is the same as 531.

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	5
MEAN TOTAL SCORE	=	3.733
STANDARD DEVIATION	=	1.427
CRONBACH'S ALPHA	=	0.702
ERROR OF MEASUREMENT	=	0.780

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
48	0.908	0.925	0.612	1.844
49	0.799	0.867	0.812	7.943
50	0.677	0.705	0.513	3.972
51	0.740	0.791	0.703	6.383
52	0.610	0.708	0.622	13.901

719 COMPUTATION - SUBTRACTION S-1 (4 items)

This scale includes selected items from scale 708. These items are 56 through 58, and 61. It is the same as 340, 532, and 613.

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	4
MEAN TOTAL SCORE	=	3.006
STANDARD DEVIATION	=	1.239
CRONBACH'S ALPHA	=	0.698
ERROR OF MEASUREMENT	=	0.681

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
56	0.854	0.880	0.594	2.979
57	0.681	0.775	0.605	12.199
58	0.740	0.804	0.752	7.943
61	0.730	0.811	0.721	9.929

720 COMPUTATION - SUBTRACTION S-2 (6 items)

This scale includes selected items from scale 708. These items are 56 through 61. It is the same as 533 and 614.

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	6
MEAN TOTAL SCORE	=	3.711
STANDARD DEVIATION	=	1.801
CRONBACH'S ALPHA	=	0.761
ERROR OF MEASUREMENT	=	0.880

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
56	0.854	0.880	0.555	2.979
57	0.681	0.775	0.633	12.199
58	0.740	0.804	0.763	7.943
59	0.330	0.401	0.666	17.589
60	0.374	0.423	0.675	11.489
61	0.730	0.811	0.758	9.929

721 COMPUTATION - MULTIPLICATION S (2 items)

This scale includes selected items from scale 709. These items are 64 and 65. It is the same as 313 and 520.

SCALE STATISTICS:

NUMBER OF CASES	=	705
NUMBER OF ITEMS	=	2
MEAN TOTAL SCORE	=	1.511
STANDARD DEVIATION	=	0.763
CRONBACH'S ALPHA	=	0.751
ERROR OF MEASUREMENT	=	0.381

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
64	0.811	0.880	0.882	7.801
65	0.699	0.796	0.802	12.199

722 ARITHMETIC FUN VS. DULL (4 items)

This scale is designed to measure the pleasure or boredom a student experiences with regard to mathematics both in an absolute sense and comparatively with other subjects.

The items which make up this scale come from Form 3-04 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 1 - 4 Page 98

SCALE STATISTICS:

MEAN =	12.87	ALPHA	= 0.49	NO. OF CASES=	689
ST.DEV=	3.45	ERR.MEAS=	2.47		

ITEM STATISTICS:

ITEM	1	2	3	4
P	3.06	3.03	3.34	3.44
ADJ. P	3.08	3.05	3.37	3.46
SERIAL CORREL	27	27	49	23
PERCENT NT	1	1	1	0

723 ARITHMETIC EASY VS. HARD (9 items)

This scale is designed to measure the ease or difficulty which a student associates with mathematics performance.

The items which make up this scale come from Form 3-04 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 5 - 13 Pages 99 - 101

SCALE STATISTICS:

MEAN =	27.03	ALPHA =	0.72	NO. OF CASES=	689
ST.DEV=	6.47	ERR.MEAS=	3.44		

ITEM STATISTICS:

ITEM	5	6	7	8	9	10	11	12	13
P	3.53	3.22	3.21	2.86	3.25	3.30	2.54	2.05	3.06
ADJ. P	3.54	3.23	3.21	2.87	3.26	3.31	2.55	2.06	3.07
SERIAL CORREL	45	57	61	61	33	60	24	-03	29
PERCENT NT	0	0	0	0	0	0	0	0	0

724 IDEAL ARITHMETIC SELF-CONCEPT (8 items)

This scale is designed to measure how a child wishes he were in relation to mathematics.

The items which make up this scale come from Form 3-04 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 14 - 21 Pages 101 - 103

SCALE STATISTICS:

MEAN =	32.23	ALPHA =	0.73	NO. OF CASES=	689
ST.DEV=	8.06	ERR.MEAS=	4.22		

ITEM STATISTICS:

ITEM	14	15	16	17	18	19	20	21
P	3.70	4.17	4.15	4.40	4.63	3.54	3.82	3.81
ADJ. P	3.74	4.17	4.16	4.40	4.63	3.56	3.84	3.86
SERIAL CORREL	27	55	53	07	52	48	51	51
PERCENT NT	1	0	0	0	0	1	0	1

725 ACTUAL ARITHMETIC SELF-CONCEPT (8 items)

This scale is designed to measure how a child sees himself in relation to mathematics.

The items which make up this scale come from Form 3-04 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 22 - 29 Pages 103 - 105

SCALE STATISTICS:

MEAN =	33.67	ALPHA =	0.71	NO. OF CASES=	689
ST.DEV=	7.39	ERR.MEAS=	4.00		

ITEM STATISTICS:

ITEM	22	23	24	25	26	27	28	29
P	3.06	4.56	5.12	4.50	4.02	4.26	4.18	3.97
ADJ. P	3.07	4.57	5.14	4.52	4.03	4.26	4.21	4.01
SERIAL CORREL	23	42	34	27	55	56	52	56
PERCENT NT	0	0	0	0	0	0	1	1

726 DEBILITATING ANXIETY (10 items)

This scale is designed to measure the degree to which mathematics achievement performance is harmed by stressful conditions (e.g., examinations).

The items which make up this scale come from Form 3-04 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 30 - 39 Pages 105 - 107

SCALE STATISTICS:

MEAN =	24.53	ALPHA =	0.80	NO. OF CASES=	690
ST.DEV=	7.77	ERR.MEAS=	3.51		

ITEM STATISTICS:

ITEM	30	31	32	33	34	35	36	37	38	39
P	2.79	2.35	2.25	2.58	2.74	2.38	2.11	2.40	2.75	2.17
ADJ. P	2.81	2.37	2.26	2.60	2.75	2.40	2.12	2.41	2.75	2.19
SERIAL CORREL	51	50	54	54	49	48	43	65	40	57
PERCENT NT	1	1	0	1	0	1	1	0	0	1

727 COMPUTATION (15 items)

This scale is intended to measure ability to add, subtract, multiply and divide whole numbers and to add or subtract simple fractions.

The items which make up this scale come from Form 3-04 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 40 - 54 Pages 108, 109

SCALE STATISTICS:

NUMBER OF CASES	=	690
NUMBER OF ITEMS	=	15
MEAN TOTAL SCORE	=	6.200
STANDARD DEVIATION	=	3.471
CRONBACH'S ALPHA	=	0.838
ERROR OF MEASUREMENT	=	1.397

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
40	0.819	0.865	0.600	5.362
41	0.642	0.717	0.681	10.435
42	0.752	0.811	0.560	7.246
43	0.497	0.721	0.706	31.014
44	0.657	0.706	0.583	6.957
45	0.661	0.716	0.673	7.681
46	0.580	0.669	0.707	13.333
47	0.300	0.400	0.639	24.928
48	0.033	0.045	0.422	26.377
49	0.452	0.547	0.814	17.391
50	0.303	0.386	0.731	21.594
51	0.249	0.310	0.706	19.710
52	0.052	0.155	0.545	66.377
53	0.138	0.229	0.609	39.855
54	0.065	0.134	0.575	51.159

728 STRUCTURE (8 items)

This scale is designed to measure knowledge of basic properties such as commutativity, associativity, distributivity, identity elements, and inverse elements with respect to addition and multiplication of whole numbers. All items are completion items.

The items which make up this scale come from Form 3-04 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 55 - 62 Page 110

SCALE STATISTICS:

NUMBER OF CASES	=	690
NUMBER OF ITEMS	=	8
MEAN TOTAL SCORE	=	2.743
STANDARD DEVIATION	=	2.154
CRONBACH'S ALPHA	=	0.798
ERROR OF MEASUREMENT	=	0.968

ITEM STATISTICS:

ITEM	P'S	ADJ. P'S	N.S. BIS	PERCENT NT
55	0.122	0.211	0.564	42.174
56	0.691	0.905	0.747	23.623
57	0.461	0.764	0.796	39.710
58	0.568	0.813	0.806	30.145
59	0.100	0.256	0.743	60.870
60	0.494	0.665	0.697	25.652
61	0.236	0.511	0.743	53.768
62	0.071	0.176	0.623	59.710

729 DOES GOOD WORK IN ARITHMETIC (2 items)

This scale is designed to determine how a pupil assesses his mathematics performance. Both items have three choices, each choice consisting of a stick figure with its corresponding text. The pupil selects the text he considers most descriptive of his particular mathematics performance and marks the figure which corresponds to the selected text.

The items which make up this scale come from Form 3-03 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 1, 4 Pages 77, 80

SCALE STATISTICS:

MEAN =	7.53	ALPHA =	0.48	NO. OF CASES=	691
ST.DEV=	1.92	ERR.MEAS=	1.38		

ITEM STATISTICS:

ITEM	1	4
P	3.96	3.58
ADJ. P	3.96	3.58
SERIAL CORREL	37	38
PERCENT NT	0	0

730 LIKES ARITHMETIC (5 items)

This scale is designed to measure a pupil's disposition toward mathematics both in an absolute sense and in comparison to other subjects. The scale consists of two 3-choice and three 5-choice items. In each case, the pupil is to select the figure which most accurately describes his feelings.

The items which make up this scale come from Form 3-03 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 2, 3, 6, 9, 11 Pages 78, 79, 82, 85, 87

SCALE STATISTICS:

MEAN =	17.77	ALPHA	= 0.80	NO. OF CASES=	690
ST.DEV=	5.50	ERR.MEAS=	2.47		

ITEM STATISTICS:

ITEM	2	3	6	9	11
P	3.80	4.20	2.85	3.52	3.40
ADJ. P	3.80	4.20	2.87	3.52	3.41
SERIAL CORREL	66	45	61	81	74
PERCENT NT	0	0	0	0	0

731 LIKES READING S (3 items)

This scale includes selected items from scale 732. These items are 5, 8, and 10.

SCALE STATISTICS:

MEAN =	11.58	ALPHA =	0.72	NO. OF CASES=	690
ST.DEV=	3.18	ERR.MEAS=	1.69		

ITEM STATISTICS:

ITEM	5	8	10
P	3.92	3.74	3.92
ADJ. P	3.94	3.75	3.92
SERIAL CORREL	44	73	59
PERCENT NT	0	0	0

732 LIKES READING (4 items)

This scale is designed to measure a pupil's pleasant experiences with regard to reading (and related areas) both in an absolute sense and in comparison to mathematics. Each item of this scale consists of a statement and five faces whose expressions range from frowning to smiling. The pupil is to select the expression which best exemplifies his feeling regarding the accompanying text. This scale is the same as 539 and is an extension of 731.

The items which make up this scale come from Form 3-03 which is reproduced elsewhere in this report. The item numbers and page references are listed below.

Items 5, 7, 8, 10 Pages 81, 83, 84, 86

SCALE STATISTICS:

MEAN =	15.35	ALPHA =	0.72	NO. OF CASES=	690
ST.DEV=	3.99	ERR.MEAS=	2.11		

ITEM STATISTICS:

ITEM	5	7	8	10
P	3.92	3.77	3.74	3.92
ADJ. P	3.94	3.77	3.75	3.92
SERIAL CORREL	47	43	70	59
PERCENT NT	0	0	0	0

733 LIKES ARITHMETIC S (3 items)

This scale includes selected items from scale 730. These items are 3, 6, and 9. It is the same as 537.

SCALE STATISTICS:

MEAN =	10.57	ALPHA	= 0.64	NO. OF CASES=	690
ST.DEV=	3.36	ERR.MEAS=	2.02		

ITEM STATISTICS:

ITEM	3	6	9
P	4.20	2.85	3.52
ADJ. P	4.20	2.87	3.52
SERIAL CORREL	38	55	63
PERCENT NT	0	0	0

APPENDICES

APPENDIX A

STANFORD ACHIEVEMENT TEST

PRIMARY II BATTERY

FORM X

by Truman L. Kelley
Richard Madden
Eric F. Gardner
Herbert C. Rudman

Copyright 1964 by Harcourt, Brace and World, Inc., New York

The Stanford Achievement Test, Primary Battery II, Form X is one of a series of tests developed to measure the important knowledges, skills, and understandings commonly accepted as desirable outcomes of the major branches of elementary curriculum. The Primary II Battery is designed for use from the middle of Grade 2 to the end of Grade 3 and includes nine subtests.

Two subtests, Word Meaning and Paragraph Meaning, were administered to the ELMA population by the school districts as part of a state-required testing program. The tests were administered by classroom teachers in a group situation in both centers in May, 1970 (spring of Grade 3). Both test centers provided raw score and grade score data for students participating in ELMA. Raw scores are converted to grade scores from tables printed in the test booklets. The grade score indicates the median score made by pupils in the norming sample at a specified grade placement.

A401 WORD MEANING: NUMBER RIGHT (36 items)

This scale is the total number of correct responses on the Stanford Achievement Primary II Battery, Form X, Word Meaning Test. The test is graduated in difficulty and requires the child to read a sentence and to select a correct word to complete the sentence. This subtest is timed (12 minutes), and the child is to work alone after being given directions.

SCALE STATISTICS:

NUMBER OF CASES	=	699
TOTAL MEAN SCORE	=	22.657
STANDARD DEVIATION	=	7.750

A402 WORD MEANING: GRADE SCORE

This scale is derived from A401.

SCALE STATISTICS:

NUMBER OF CASES	=	699
TOTAL MEAN SCORE	=	36.940
STANDARD DEVIATION	=	13.672

A403 PARAGRAPH MEANING: NUMBER RIGHT (60 items)

This scale is the total number of correct responses on the Stanford Achievement Primary II Battery, Form X, Paragraph Meaning Test. The test is graduated in difficulty and consists of a series of paragraphs from each of which one or more words have been omitted. The child is to select the proper word for each omission from four choices that are afforded him. This subtest is timed (25 minutes), and the child is to work alone after being given directions.

SCALE STATISTICS:

NUMBER OF CASES	=	697
TOTAL MEAN SCORE	=	37.339
STANDARD DEVIATION	=	13.250

A404 PARAGRAPH MEANING: GRADE SCORE

This scale is derived from A403

SCALE STATISTICS:

NUMBER OF CASES	=	697
TOTAL MEAN SCORE	=	35.836
STANDARD DEVIATION	=	12.935

A405 TOTAL READING: NUMBER RIGHT (96 items)

This is obtained by adding the raw scores on the Word Meaning and the Paragraph Meaning tests.

SCALE STATISTICS:

NUMBER OF CASES	=	697
TOTAL MEAN SCORE	=	60.022
STANDARD DEVIATION	=	20.260

A406 TOTAL READING: GRADE SCORE

This is obtained by adding the raw scores on the Word Meaning and the Paragraph Meaning tests and then using a conversion table provided by the publisher to determine the Total Reading Grade Score.

SCALE STATISTICS:

NUMBER OF CASES	=	697
TOTAL MEAN SCORE	=	35.742
STANDARD DEVIATION	=	12.229

A411 WORD STUDY SKILLS: NUMBER RIGHT (64 items)

This is an optional test. It was administered to a very small proportion of the ELMA population and, therefore, is not utilized in any analyses.

A412 WORD STUDY SKILLS: GRADE SCORE

See A411

APPENDIX B

Formulas for Item and Scale Statistics

A. Formulas Used for Scales Containing Dichotomous Items

The formulas for the statistics presented for each ELMA scale will be shown. The statistics were obtained from the SMSG Item Analysis Program.[1] This program handles only dichotomous items.

Let X_{ij} be the score for case j on item i.

The items were scored so that

$$X_{ij} = \begin{cases} 1, & \text{if case } j \text{ responds correctly to item } i \\ 0, & \text{otherwise} \end{cases}$$

Let

n = total number of cases

n_i = the number who attempted item i

k = total number of items on the scale.

The Item Mean, P, is

$$\bar{X}_i = \frac{1}{n} \sum_{j=1}^{n} X_{ij}$$

and the Adjusted Item Mean, ADJ. P, is

$$\hat{\bar{X}}_i = \frac{1}{n_i} \sum_{j=1}^{n} X_{ij}$$

$$\text{PERCENT NT} = \frac{n - n_i}{n}$$

The non-spurious Biserial Correlation coefficient, N.S. BIS, is

$$r = \frac{r_{bis}\,\sigma - \frac{pq}{z}}{\sqrt{\sigma^2 + pq - 2r_{bis}\,\sigma z}},$$

---

[1] For a description of the computer program for the IBM 360/67, see the unpublished SMSG paper "Item Analysis Program" by W. E. Geeslin and Ed Cruz.

where

$p = \bar{X}_i$ = proportion of cases getting item correct

$q = 1 - \bar{X}_i$ = proportion of cases getting item incorrect

Z = ordinate for unit normal curve at point where proportion of cases cut off is p

Y_{ij} = the total scale score <u>with item</u> i removed for case j

σ = the standard deviation of the Y_{ij}'s

d = difference in mean score of the Y_{ij}'s for those cases with item i correct and those cases with item i incorrect

$$r_{bis} = \frac{pq}{z}\left(\frac{d}{\sigma}\right) .$$

The scale score for case j is

$$S_j = \sum_{i=1}^{k} X_{ij} .$$

The scale <u>MEAN TOTAL SCORE</u> is

$$\bar{S} = \frac{1}{n}\sum_{j=1}^{n} S_j = \sum_{i=1}^{k} \bar{X}_i .$$

The total scale variance is

$$V_t = \frac{1}{n}\sum_{j=1}^{n} S_j^2 - \bar{S}^2 .$$

The total scale <u>STANDARD DEVIATION</u> is

$$S_t = \sqrt{V_t} .$$

The item variance for item i is

$$V_i = \frac{\Sigma X_i^2 - \frac{(\Sigma X_i)^2}{n}}{n} .$$

CRONBACH'S ALPHA (reliability) is

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum_{i=1}^{k} V_i}{V_t}\right) .$$

The standard ERROR OF MEASUREMENT is

$$S_e = \sqrt{V_t - \alpha V_t}$$

$$= S_t\sqrt{1 - \alpha} .$$

B. Formulas Used for Attitude Scales

The items of the attitude scales were not dichotomous. A different computer program was used to calculate item and scale statistics for the attitude scales.(2)

The serial correlation coefficient replaced the biserial coefficient for the attitude items. For a description of the calculation of the serial correlation coefficient see the articles by Jaspen(3, 4) or the text by Wert.(5)

All other formulas remain the same as those used above except that item responses are not restricted to "0" and "1", and the unbiased estimate of the variance was used instead of the biased estimate.

---

(2) For a description of the computer program for the IBM 360/67, see the unpublished SMSG paper "Item Analysis Program for Non-dichotomous Items" by W. E. Geeslin and Ed Cruz.

(3) Jaspen, Educational and Psychological Measurement, 1965, XXV, pp. 229-233.

(4) Jaspen, Psychometrika, 1946, 11, pp. 23-30.

(5) Wert, et al., Statistical Methods. New York: Appleton, 1954, pp. 256 cf.

ELMA REPORTS

No. 1. A Longitudinal Study of Mathematical Achievement in the Primary School Years: Description of Design, Sample, and Factor Analyses of Tests.

No. 2. A Longitudinal Study of Mathematical Achievement in the Primary School Years: Curriculum and Socio-Economic Comparisons and Predictions from Previous Achievement.

Single copies available from the School Mathematics Study Group, Cedar Hall, Stanford University, Stanford, Calif. 94305

ELMA TECHNICAL REPORTS

No. 1. Kindergarten Test Batteries, Description and Statistical Properties of Scales.

No. 2. Grade 1 Test Batteries, Description and Statistical Properties of Scales.

No. 3. Grade 2 Test Batteries, Description and Statistcial Properties of Scales.

No. 4. Grade 3 Test Batteries, Description and Statistical Properties of Scales.

Published by the School Mathematics Study Group, Stanford University, and available from A. C. Vroman, Inc., 2085 E. Foothill Blvd., Pasadena, Calif. 91109